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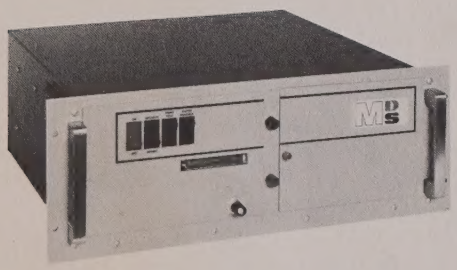
2016

HIGH SPEED PRINTER

TECHNICAL MANUAL



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2016

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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual describes the operating procedures, the theory of operation, and the maintenance and repair instructions for the Series 2016 Digital Printer.

1.2 GENERAL DESCRIPTION

The 2016 Digital Printer will record on paper roll or fanfolded stock, the data obtained from electronic counters, digital voltmeters, digital computors, or any device which supplies an output code for each printable character. The printer is completely self-contained and consists of a printing mechanism, power supply, and logic circuits. All logic circuits are mounted on keyed, printed circuit cards. The printer mechanism is mounted on slides and may be pulled from inside the main chassis for paper and ribbon loading (see Figure 1-1).

The standard printing speed is 20 lines per second. Any number of columns of print (up to 20 columns) can be selected. Input to the printer is a five-wire, 8-4-2-1 binary coded decimal input with a column inhibit line.

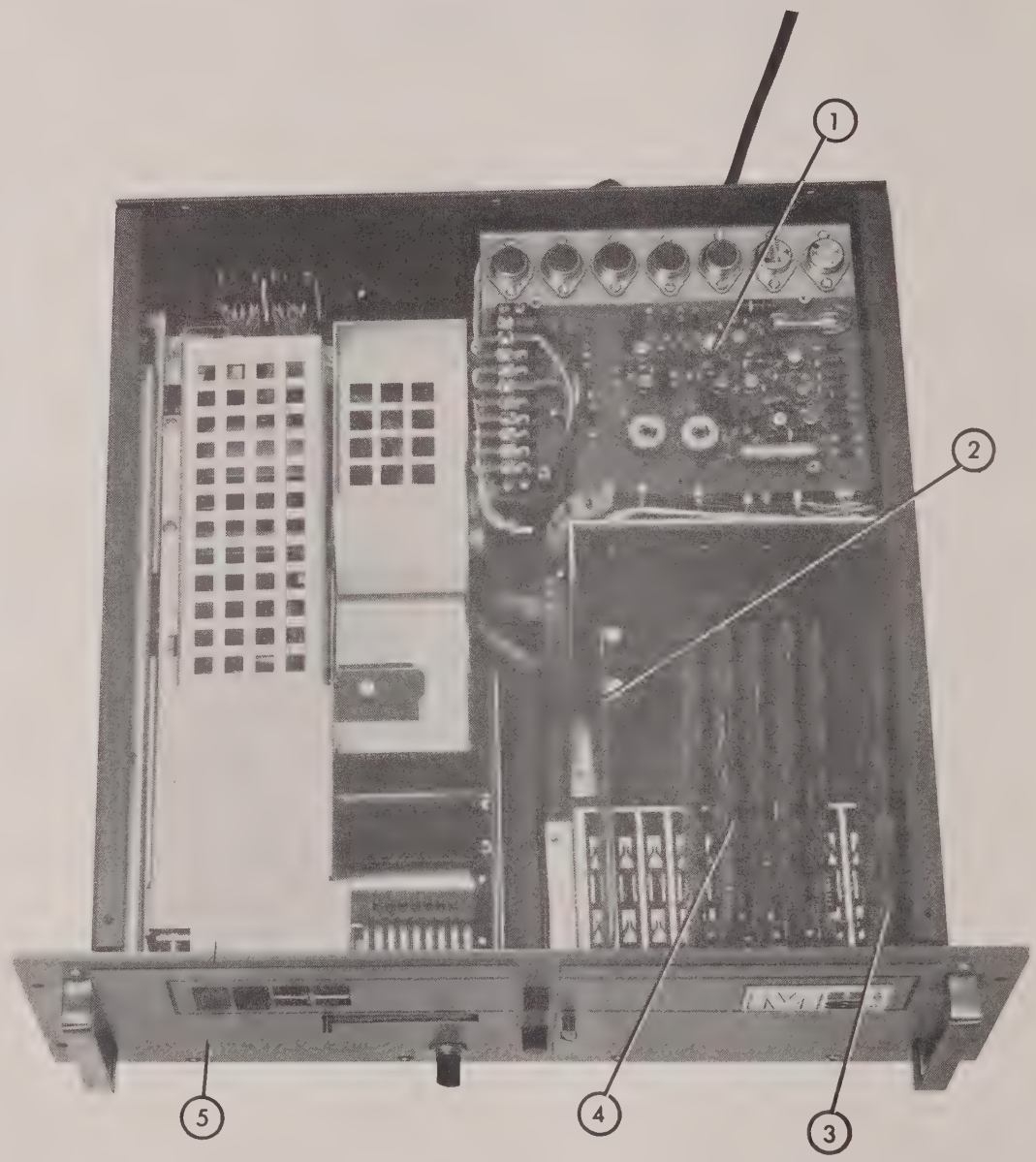
The printer mechanism operates on a unique, simple principle which has only two moving parts per column of print. There is a minimum of periodic maintenance required.

1.2.1 SIZE AND WEIGHT

(1) The complete Model 2016 weighs 50 pounds.

(2) The mechanism without a Ribbon Reverse action weighs 15 pounds and with the ribbon reverse action, 18 pounds.

(3) Outside dimensions (see Figure 1-2).



1. Power Supply
2. Print Actuator Fuse Card
3. Logic Control Card
4. 5 Driver Cards
5. Printer Mechanism

Figure 1-1 Top View

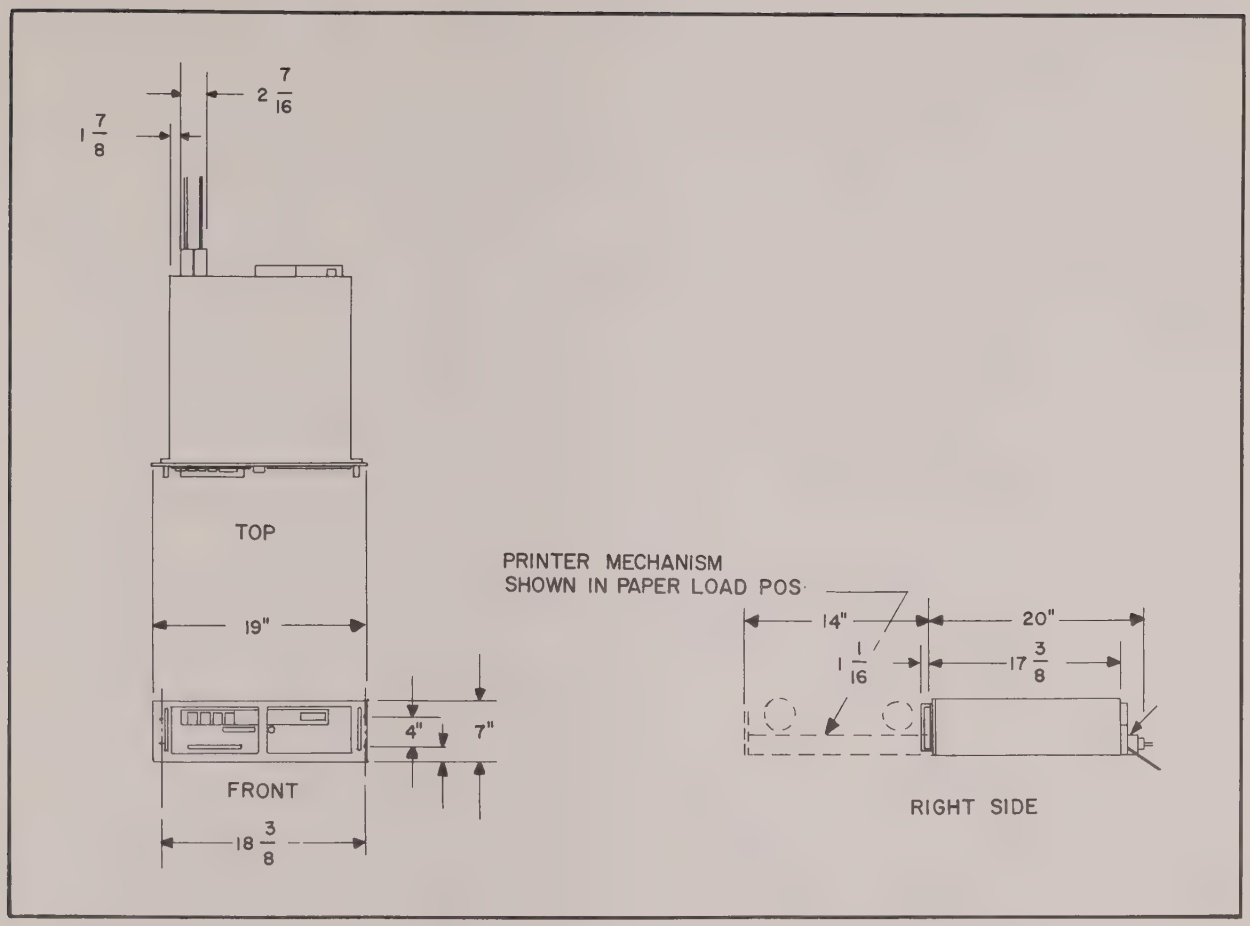


Figure 1-2 Outside Dimensions

1.2.2 COLOR AND FINISH

Standard color is dark gray with a textured finish and the front panel has a light gray matte smooth finish.

1.3 SPECIFICATIONS

General specifications which are applicable to the Series 2016 Printer are described in Sections 1.3.1 to 1.3.8.

1.3.1 PRINT CYCLE

50 MS for 20 lines per second.

1.3.2 ENVIRONMENT

(1)	Maximum altitude:	20,000 - 30,000 feet
(2)	Minimum temperature:	32°F
(3)	Maximum temperature:	100°F

1.3.3 POWER REQUIREMENTS

(1) 105V - 125V, 60Hz, 3 Amperes Maximum

(2) 210V - 250V, 50Hz, 2 Amperes Maximum

1.3.4 PRINTER

(1)	Maximum number of columns:	20
(2)	Column spacing:	10 Columns/Inch
(3)	Line spacing:	6 Lines/Inch
(4)	Number of characters:	16
(5)	Number of fonts/drum:	3 Identical
(6)	Mode of operation:	Asynchonous
(7)	Data Entry:	Numeric - 4 Wire BCD 8421

1.3.5 PRINT DRUM

The Print Drum is 20 columns wide and has 48 equally spaced characters on its periphy. The embossed characters are .0575" wide and .0920" high. The actual printed character is .060" wide and .100" high. The nominal speed of rotation is 720 RPM.

1.3.6 PAPER STOCK

Normally used is a 2 3/4" wide roll of sensitized (IMPACT) paper. However, unsenitized roll or fanfolded paper may be used with the optional Ribbon Reverse Mechanism.

1.3.7 ELECTRONIC

The unit is completely composed of TTL integrated circuits. All interface signals must be TTL compatable.

1.3.8 LOGIC

The integrated circuits of the printer will interface with standard logic levels or inverted logic levels.

(1) Standard - logic "1" = +2.4V to 5.0V, 16 MA supply; logic "0" = 0V to 0.40, 3.2 MA sink capability.

(2) Inverted - logic "1" = 0V to 0.40V, 3.2 MA sink capability; logic "0" = 2.4V to 5.0V, 16 MA supply.

1.4 STANDARD EQUIPMENT SUPPLIED

The printer, supplied from the factory, includes the basic mechanism, the power supply, and the electronic circuits.

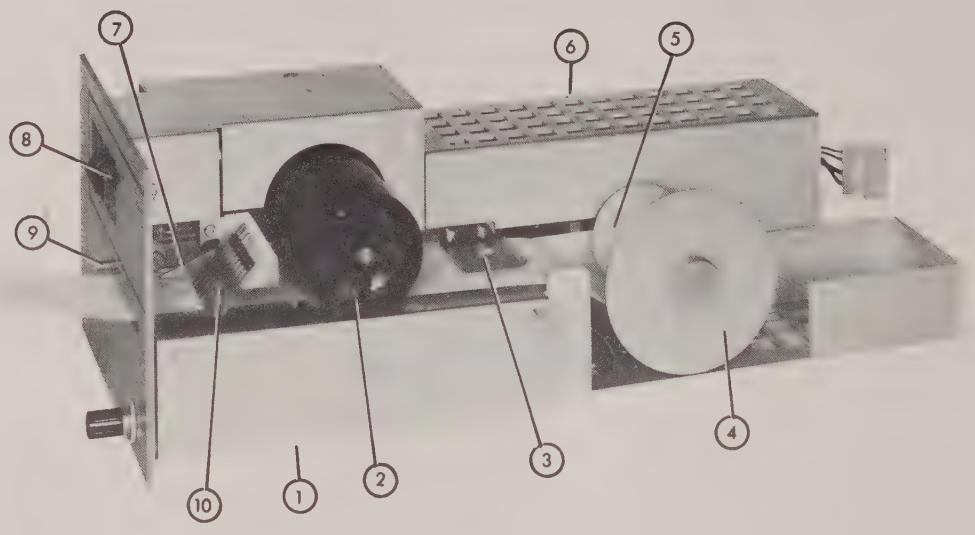
1.4.1 BASIC MECHANISM

(See Figure 1-3).

This mechanism includes the character drum, the required number of hammer-solenoid assemblies, a paper supply and a paper advance mechanism. The printer uses impact paper. The hammer-solenoid modules are located only in the positions specified by the user. The selected positions determine which columns can be printed on paper tape and which are permanently blank.

1.4.2 ELECTRONIC COMPLEMENT

The electronic section is made up of TTL integrated circuits. Two different type PC cards are used, one Logic Control Card and five Buffered Input and Driver Circuits Cards.



1. Actuators (behind cover)
2. Character Drum
3. Rear Paper Guide and "Paper Out" Switch
4. Paper Retainer
5. Paper Roll (impact sensitized)
6. Cover
7. Paper Advance Mechanism
8. Control Panel
9. Paper Release Lever
10. Paper Rake

Figure 1-3 Basic Mechanism

1.4.3 ZERO SUPPRESSION

(See Section 4.14).

This standard feature with all Series 2016 Printers is programmable by means of switches located on all driver circuit PC cards. Therefore, printing formats can be controlled through the use of the switches provided.

of switches located on all driver circuit PC cards. Therefore, printing formats can be controlled through the use of the switches provided.

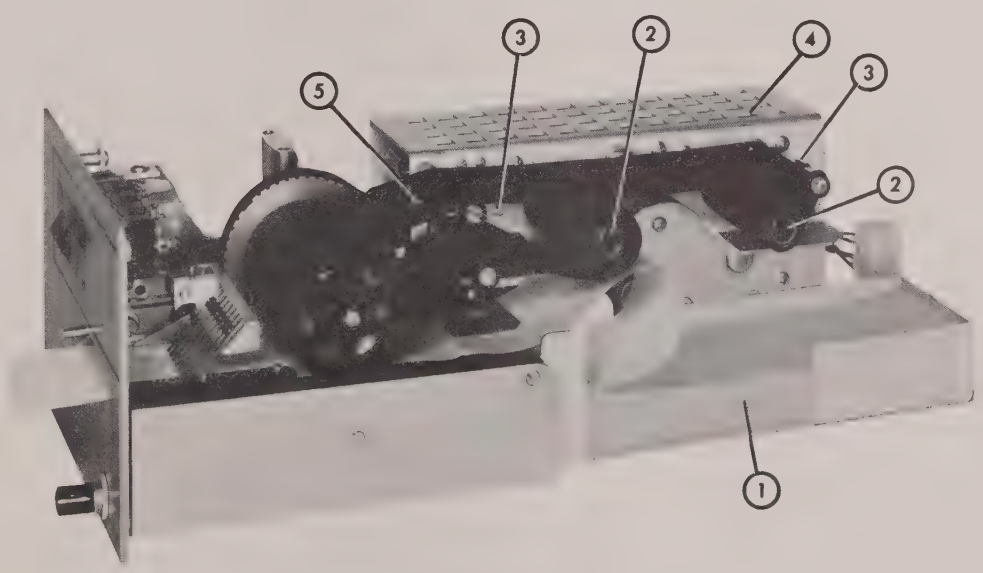
1.4.4 STANDARD PRINT DRUM CHARACTERS

Standard 0 thru 9 -Ω~+ . *

1.5 AVAILABLE OPTIONS

1.5.1 RIBBON MECHANISM

The optional Ribbon Mechanism is used in the printer when normal paper rather than impact paper is used for printing (see Figure 1-4).



1. Fanfolded Paper Supply (unsensitized)
2. Ribbon Spools
3. Ribbon Reverse Microswitch
4. Ribbon Reverse Mechanism (under cover)
5. Inked Ribbon

Figure 1-4 Basic Mechanism With Ribbon Reverse Mechanism

1.5.2 PRINT DRUM

One option is available for the Print Drum character arrangement (see Table 1-1). For special Print Drums contact the factory of sales representative.

Table 1-1 Data Code and Character Selection

INPUT CODE		CHARACTER SELECTION	
Decimal	8-4-2-1	Standard	Option 1
0	0 0 0 0	0	0
1	0 0 0 1	1	1
2	0 0 1 0	2	2
3	0 0 1 1	3	3
4	0 1 0 0	4	4
5	0 1 0 1	5	5
6	0 1 1 0	6	6
7	0 1 1 1	7	7
8	1 0 0 0	8	8
9	1 0 0 1	9	9
10	1 0 1 0	-	.
11	1 0 1 1	∿	+
12	1 1 0 0	⌐	-
13	1 1 0 1	+	A
14	1 1 1 0	.	B
15	1 1 1 1	*	C

1.5.3 COLOR AND FINISH

Custom color and finish is available as an option; contact the factory or sales representative.

SECTION II
INSTALLATION

2.1 UNPACKING AND INSPECTING

The printer is shipped mounted on a wooden pallet in a specially constructed, protective container. Save all packing material including the pallet.

2.1.1 UNPACKING

Cut the two bands that strap the container to the wooden pallet and open the top of the container. Remove the cardboard insert and protective cushion-paper covering. Place all packing material back in its original position in the container, and set the packing aside for possible storage or shipment of the printer.

2.1.2 REPACKING

(1) Wrap and seal the printer first in water retardant paper and seal.

(2) Place two layers of 2" x 4 ounce rubberized hair packing-pads on the bottom of the packing container.

(3) Place the printer inside the container with the printer in the upright position.

(4) Place the rubberized hair pads between the sides, ends, and top of the printer. Close and seal the container using paper tape or an equivalent sealing material.

(5) Place the container (with the printer in the normal upright position) on the wooden shipping pallet. Attach the shipping container to the pallet either with steel bands or Permacel filament tape (or equal).

2.1.3 INSPECTION

Check the printer for any signs of physical damage such as dents, broken

knobs, and obvious indications of improper handling. Remove the single shipping screw from the bottom of the printer so that the mechanism is free to move. Pull the mechanism forward on its mounting slides. It should move freely. Inspect the mechanism for any loose or broken parts.

2.1.4 REPORTING DAMAGE

If the instrument is damaged in any way, notify the carrier immediately and report the damage.

2.2 PRE-INSTALLATION CHECK

Before operating the printer or connecting it to the power line, perform this check. Pull the printer mechanism forward on its slide rails and inspect to make sure the paper tape is properly loaded (see Section 3.6 for Paper Loading Procedure). Operation without paper may cause serious damage. Also inspect the inked ribbon to make sure it is properly threaded if the printer uses the Ribbon Reverse Mechanism.

2.3 CONNECTING THE PRINTER

There are two connectors located at the rear of the printer. All data connections, both input and output, are made at these two connectors (see Connecting Chart in Section VI).

NOTE

When connecting the data input lines, the column inhibit lines must also be connected. If the column inhibit line is not used, it should be tied to logical "0" if the logic is standard; or it should be tied to logical "1" if the logic is inverted.

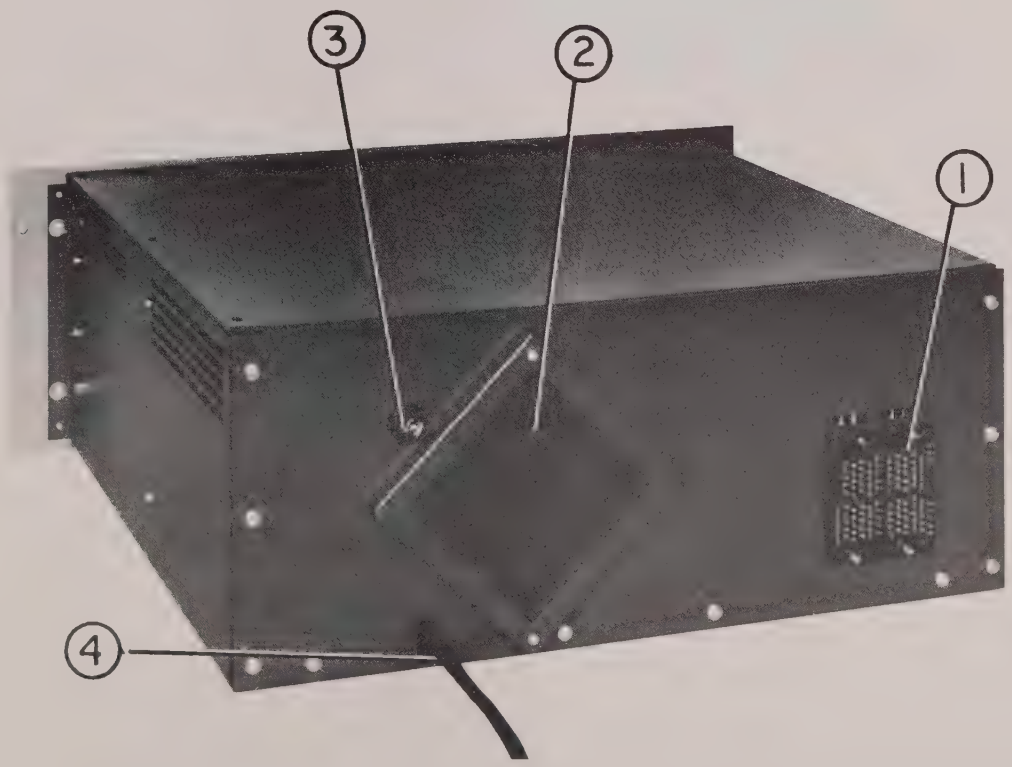
2.4 INSTALLATION

The printer may be mounted in a standard 19" rack or used as a table model.

2.4.1 RESTRICTIONS

(See Figure 2-1).

The printer is cooled by forced air drawn through a filtered intake at the rear. Make sure that exhaust air from other equipment doesn't discharge into the intake of the printer and also that no blockage occurs at the intake.



1. Input Connectors J1 and J2
2. Air Filter
3. Main Line Fuse
4. Power Cord

Figure 2-1 Rear Panel

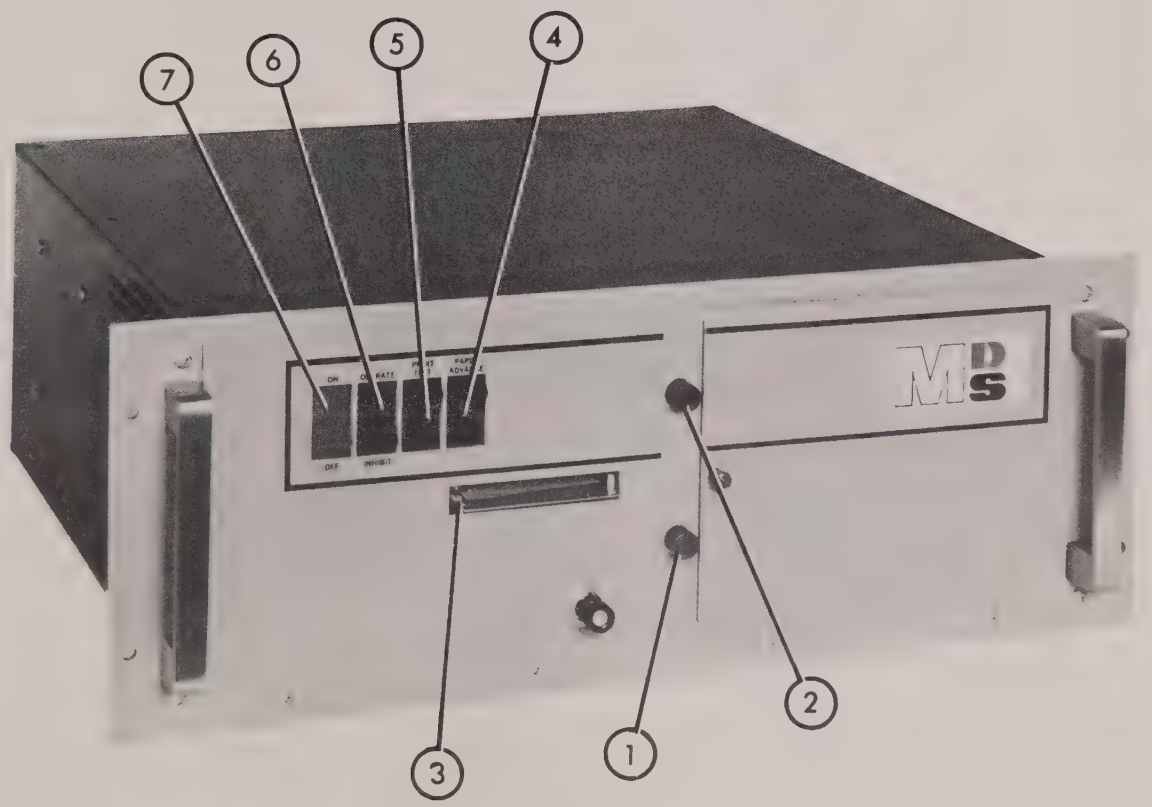
2.5 INTERFACING

Interfacing is accomplished through the two connectors J1 and J2 on the rear panel. Figure 6-13 provides signal titles and connections to the proper pins.

SECTION III
OPERATION

3.1 FRONT PANEL CONTROLS AND INDICATORS

(See Figure 3-1).



1. Paper Out Indicator
2. Power On Indicator
3. Paper Release Lever
4. Paper Advance Switch
5. Print Test Switch
6. On Line/Off Line Switch
7. Power On/Off Switch

Figure 3-1 Front Panel

3.1.1 POWER ON-OFF

This switch controls the main power for the power supply, the print drum motor, and the Ribbon Reverse motor.

CAUTION

Before turning power on place printer in off-line mode. Wait until drum is up to speed (5 seconds) before switching to operate on-line. Failure to comply could result in the loss of print actuator fuses.

When turning power off place printer in off-line mode.

3.1.2 ON LINE/OFF LINE

This switch provides a means for off line operation. When the switch is in the OFF LINE position the printer will not accept a PRINT COMMAND and the LOCK-OUT signal will be present; under these conditions the printer can be operated by the PRINT TEST switch. This test switch provides for printer testing while the printer is connected to the data source. In order to use the PRINT TEST switch, the ON LINE/OFF LINE switch must be in the OFF LINE position. While using the printer in this mode, data is not cleared or loaded in the buffers, therefore data previously in the buffers will be continuously printed.

3.1.3 PAPER ADVANCE SWITCH

This momentary switch provides a means of advancing paper without printing.

3.1.4 PAPER RELEASE LEVER

This lever releases the paper moving mechanism. When the lever is pressed down it allows paper to be moved manually.

3.1.5 POWER ON INDICATOR (GREEN)

This indicator lights when the POWER switch is in the ON position.

3.1.6 PAPER OUT INDICATOR (RED)

This indicator lights when no paper is under the rear paper guide.

3.2 MODES OF OPERATION

Two modes of operation and a function are controllable from the front panel of the printer; PRINT TEST, NORMAL operation and PAPER ADVANCE.

3.3 NORMAL OPERATION MODE

The front panel switches should be set as follows:

POWER:	ON
ON LINE/OFF LINE:	ON LINE
PRINT TEST:	OFF
PAPER ADVANCE:	OFF

Normal operation provides that the printer follows the normal sequence of Print Cycle and Paper Feed Cycle.

3.4 PRINT TEST MODE

The front panel switches should be set as follows:

POWER:	ON
ON LINE/OFF LINE	OFF LINE
PRINT TEST:	ON
PAPER ADVANCE:	OFF

Test operation provides a continuous print of the same line of data by jamming the Instruction F/F.

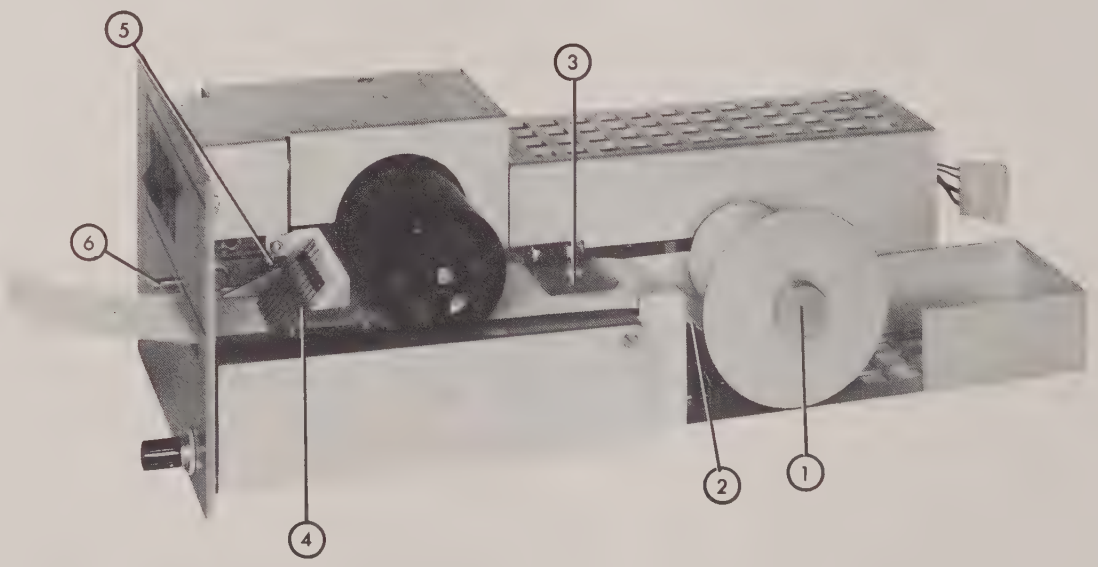
3.5 PAPER ADVANCE FUNCTION

To initiate the Paper Advance function, depress the PAPER ADVANCE switch.

Paper Advance provides mechanical paper movement from the front panel. This function allows the normal cycle sequences except that the Print F/F is not set, and printing does not occur.

3.6 PAPER REFILLING

(See Figure 3-2).



1. Paper Roll Release Screw
2. Paper feed from bottom of roll
3. Paper Guide and Paper Out Button
4. Paper Rake
5. Idler Wheel
6. PAPER RELEASE LEVER

Figure 3-2 Paper Refilling

The 2016 printer will use either rolled paper or optional fanfolded paper. Fanfolded paper will be placed in the paper tray and the rolled paper should be placed on paper roll shaft.

3.6.1 ROLLED PAPER REFILLING

To refill the rolled paper follow these steps:

(1) Turn the roll-paper release screw counterclockwise until it is free of the shaft and remove it.

(2) Remove and discard the empty paper spool.

(3) Place a roll of paper on the paper-roll shaft so that the paper will feed from the bottom of the roll and install the paper-roll release screw.

(4) Pass the paper between the rear paper guides and the paper out button and slide it forward under the drum.

(5) Hold down the Paper Release Lever and place the paper under the idler wheel and paper brush mechanism.

(6) Continue holding the Paper Release Lever down, grasp the paper and pull it forward a few inches while inspecting the feed. The paper should move freely.

(7) Allow the Paper Release Lever to return to its normal position and check the mechanical movement by operating in the PAPER-ADVANCE function while observing the feed.

3.6.2 FANFOLDED PAPER REFILLING (OPTION)

To refill the fanfolded paper follow these steps:

(1) Place a pack of fanfolded paper in the tray.

(2) Pass the paper from the top of the pack through the mechanism as described in Section 3.6.1 (4) through (7).

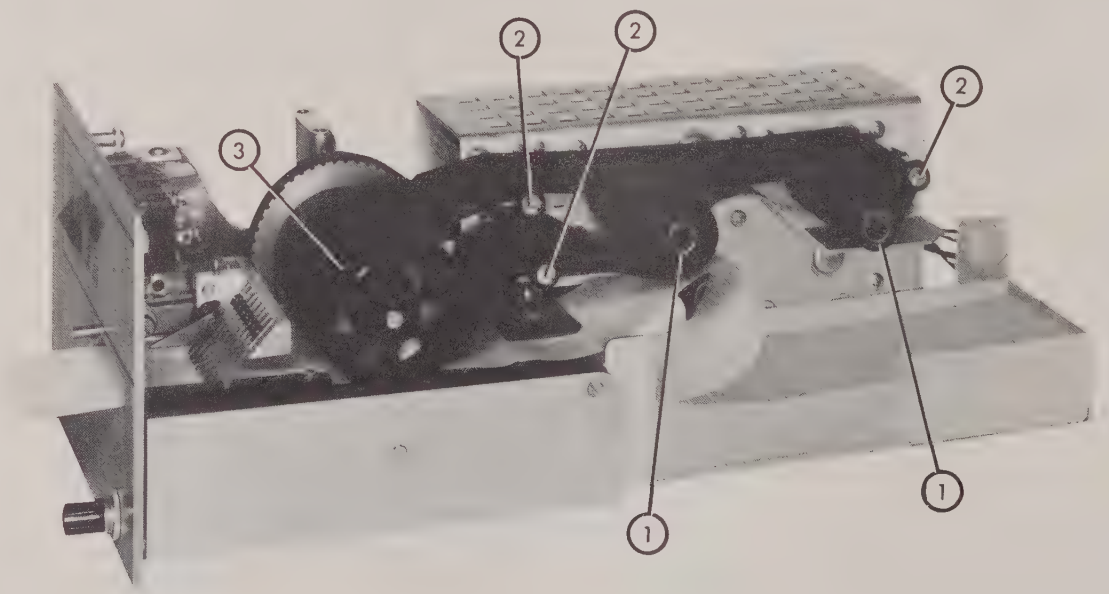
NOTE

To switch from paper roll to the fanfolded paper option it will be

necessary to place an order for the fanfolded option.

3.7 INKED RIBBON REPLACEMENT (UNITS WITH RIBBON OPTION)

(See Figure 3-3).



1. Ribbon Spools mounted on Arbor Shafts
2. Ribbon Guides
3. Ribbon placed over Print Drum Cover

Figure 3-3 Inked Ribbon Replacement

If the printer has the optional ribbon mechanism, ribbon replacement may be necessary. If so follow this procedure:

(1) Remove the old ribbon by pulling the ribbon-spool from the ribbon arbor shafts and discard the old ribbon.

(2) Since the new ribbon is supplied with two spools, simply slide the new spools on the ribbon arbor shafts and place the ribbon on the

guides and over the print drum as shown in Figure 3-3.

CAUTION

The inked ribbon must pass between the ribbon guides and the actuating lever of the ribbon reversing switch. If it doesn't, the ribbon will not reverse at the end of its travel and the ribbon may be damaged.

3.8 OPERATIONAL PRECAUTIONS

Do not operate the printer without paper under the printing drum. Always make a visual check before operating the printer.

The paper rake permits paper motion in only one direction (forward); therefore any attempt to move paper backwards will damage the rake.

To tear paper at the front panel, tear it directly up or down and away from the Paper Emittor mouth. Attempting to tear in any other direction will damage the paper rake.

Do not operate the printer with the top cover removed from the electronic (section) cabinet. With the cover removed, air circulation is hindered and proper circulation is necessary for cooling. Make a visual check of the air filter at the rear of the housing, as a dirty filter can also restrict cooling.

3.9 CHECK-OUT PROCEDURE

Before going to full operation in any mode, it is recommended that this simple check-out procedure be followed:

(1) Turn the Power ON.

(2) Check to see if the Power-ON Indicator (Green) is lighted.

(3) Check to see that the fan is operating.

(4) Check to see that the inked ribbon is traversing from one spool to the other.

(5) Depress the PAPER ADVANCE switch to initiate a paper feed and observe that the mechanics work correctly.

3.10 OPERATING HINTS

MDS papers and ribbons are specially selected to provide the best performance with the least amount of wear on the printer mechanism. Use of inferior paper and ribbon can result in excessive lint deposits, poor print quality and excessive wear. Ordering replacement ribbons and papers from the factory assures optimum performance from the printer.

SECTION IV
THEORY of OPERATION

4.1 BASIC OPERATING PRINCIPLE

(See Figure 4-1).

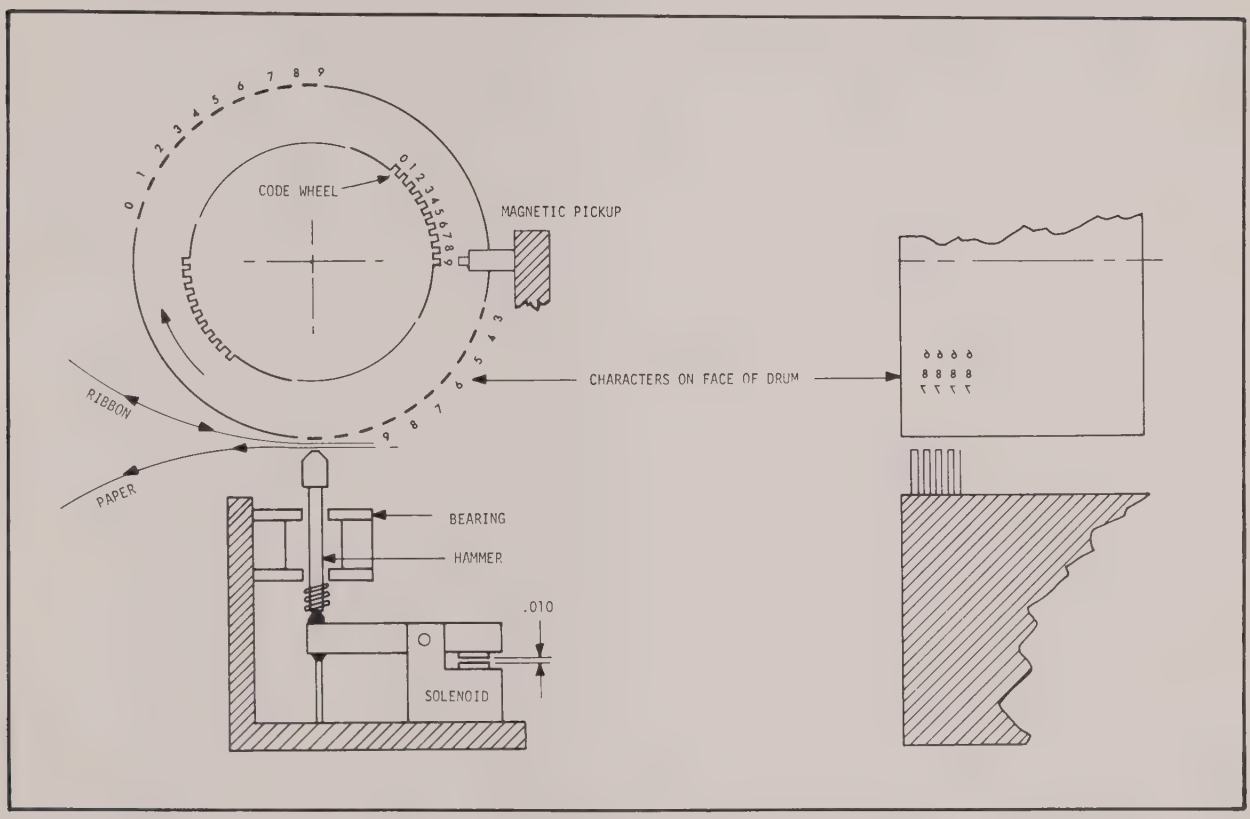


Figure 4-1 Basic Operating Principle

During operation, the print drum rotates at a constant speed past a row of hammers. There is one solenoid driven hammer opposite each column on the drum. The desired character in a column is printed when the hammer for that column strikes at the instant the character is opposite the hammer.

Position of the moving character is determined in the printer by means of a code wheel in conjunction with a magnetic pick-up head. The code wheel is a

gear like device that has a tooth for each row of characters on the drum. The code wheel is mechanically connected to the print drum so that it rotates in exact unison with the drum. Each time a tooth passes the reluctance (magnetic) pickup, a pulse is generated. These pulses, called STEP pulses or times, serve as the internal clock for the printer. Detection of a missing tooth (STEP time) produces a synchronizing pulse for the printer. The synchronizing pulse, SS1, signifies that the first character is going to pass the hammers at the next STEP time. Thus the code wheel in conjunction with a binary counter, that counts every STEP time, identifies each row of characters passing the hammers at any instant.

The data buffers are compared with the BCD code from the binary counter through a comparator. If they compare, the hammers will strike causing that character to print. If they don't compare the drum continues to rotate without incident. As one complete line is printed, paper is advance automatically.

4.2 PAPER MOVEMENT

The paper is pinched between an idler wheel and a drive wheel, mounted on the shaft of an electrically operated stepping motor. This stepping motor is activated by an electronic driving circuit and a delay flop as the Scan Counter reaches a count of 16 indicating a complete font has been scanned. When activated the drive wheel advances the paper one position (approximately 1/6") after each Print Cycle.

4.3 RIBBON REVERSE MOVEMENT (UNITS WITH RIBBON OPTION)

The ribbon reversing mechanism consists of two motors (one CW, one CCW), two microswitches and one relay. Upon initial turn-on, the CCW motor is ener-

gized which winds the ribbon onto the front spool. When the ribbon reaches the end of its travel, a plastic bar attached to the ribbon actuates the rear microswitch which in turn energizes the relay. The relay switches off the CCW motor and switches on the CW motor. Another set of relay contacts keeps the relay energized until the ribbon reaches the end of its travel and actuates the front microswitch thus completing one cycle of operation.

4.4 INTERFACE

The printer interface can accept both positive and negative logic for most interface signals.

4.5 INPUT CONTROL SIGNALS

4.5.1 DATA LINES

The 2016 accepts a 5-wire data input for each column, 4 lines for BCD-8421 input and one line for column inhibit. Input of data to the printer is parallel entry. Data should be on the line before or simultaneously with the PRINT COMMAND signal. Data lines may be deactivated at any time after the printer LOCK-OUT signal is received. Typical time from rise of PRINT COMMAND to receipt of LOCK-OUT signal is 0.5 microseconds.

4.5.2 PRINT COMMAND

The PRINT COMMAND signal in a logic 1 state will transfer the input data to the printer buffer, generate printer LOCK-OUT and initiate a Print Cycle. PRINT COMMAND should be active simultaneously with or after the data lines have been activated. The PRINT COMMAND may be deactivated at any time after the printer LOCK-OUT signal is received.

4.5.3 LOGIC LEVELS

The 2016 can accept either of two levels for a PRINT COMMAND:

(1) Positive Going: 0.4V to +4.5V

(2) Negative Going: +4.5V to 0.4V

(3) Pulse Width: Minimum pulse width for a PRINT COMMAND is 3 microseconds if its not controlled by the printer LOCK-OUT signal.

4.5.4 EXTERNAL PAPER FEED

A standard feature of the 2016 is a means of moving paper without printing. This input is EXTERNAL PAPER FEED and is active at 0V to +0.4V. The external input should never be initiated when the LOCK-OUT condition exists. The duration of time the line is active determines the number of lines fed.

4.6 OUTPUT CONTROL SIGNALS

4.6.1 LOCK-OUT

Two levels are provided for LOCK-OUT 0V to +0.4V with a capability of sinking 14 MA or +2.4V to +5.0V with 16 MA supplied. LOCK-OUT is activated after the propagation of the PRINT COMMAND through the buffered input stages. LOCK-OUT is also generated by OUT OF PAPER, EXTERNAL PAPER FEED, MANUAL PAPER FEED, PRINT TEST, and PRINTER OFF LINE.

A PRINT COMMAND may be disabled by the printer assuming a LOCK-OUT state. LOCK-OUT normally occurs within 2 microseconds after the printer has received a PRINT COMMAND. At this time the data has been stored by the printer and the interface may be released. LOCK-OUT in a logic 1 state indicates one of the following conditions; the printer has accepted a previous in-

struction, its buffers are in use, the printer is off-line, the printer is out of paper, or external or manual paper feed is in process. Any PRINT COMMAND given with LOCK-OUT in the logic "1" state will be ignored by the printer until LOCK-OUT returns to a logic 0 state.

4.6.2 ON-LINE STATUS

This signal at 0V indicates the printer is off-line, +5V indicates the printer is on-line. The printer is on-line when the ON LINE/OFF LINE switch on the front panel is in the ON LINE position.

4.6.3 OUT-OF-PAPER STATUS

This signal at 0V indicates the printer senses it is out of paper.

4.7 INTERNAL SIGNAL DESCRIPTION

4.7.1 PR (PRINT F/F SET, PRINT CYCLE)

This is the main control for the printer. When set the printer does a Print Cycle and when reset the printer does a Paper Feed Cycle.

4.7.2 STEP

This is the internal timing pulse generated by the reluctance pick-up as a tooth passes.

4.7.3 $\overline{\text{STEP}}$

This is the time between STEP times.

4.7.4 SS1

This is a pulse generated once every drum revolution and serves to resynchronize the printer Character Code Counter.

4.7.5 INSTRUCTION (INSTRUCTION F/F SET)

This signal generates LOCK-OUT and is a precondition for setting the Print F/F. The Instruction F/F is set by the PRINT COMMAND after data has been strobed into the data buffers.

4.7.6 CHARACTER CODE COUNTER cc

This is a 4 bit binary counter that counts in sequence with the characters on the print drum at every STEP time and synchronizes on SS1. The count codes are compared with Data F/F's through the comparator circuitry.

4.7.7 SCAN COUNTER sc

This is a binary counter that counts the number of characters compared during a Print Cycle and it insures that a complete font is compared with the input Data F/F's.

4.7.8 DATA BUSS, DST, DCLR

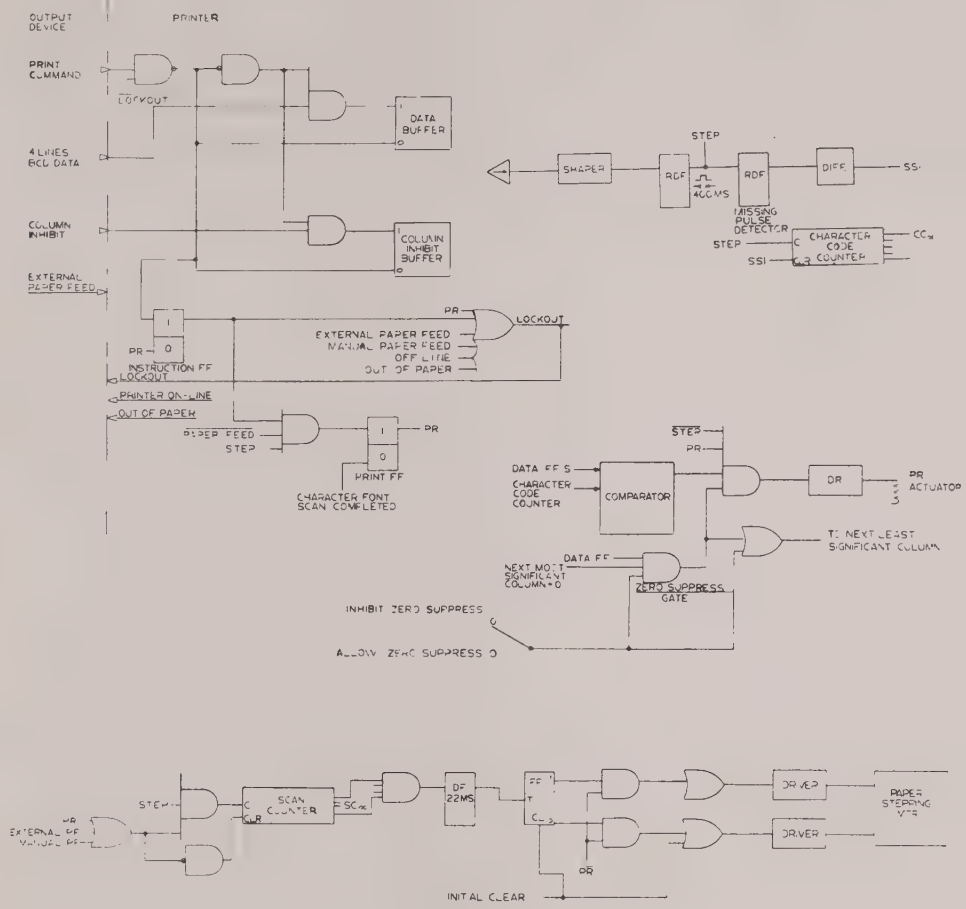
These are signals that strobe, load and clear information in the buffers.

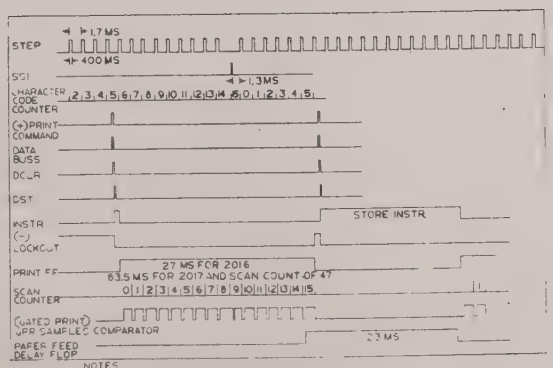
4.7.9 GPR (GATED PRINT)

This signal enables the drivers to activate when there is a compare through the comparator and no Zero Suppress is present. It is produced through a gate when PR and $\overline{\text{STEP}}$ are active in order not to get a print when characters codes are changing.

4.8 GENERAL BLOCK DIAGRAM

The block diagram (see Figure 4-2) will enable better understanding of the electronic operation. More detailed drawings may be found in Section VI.





NOTES
1. NO SCALE OF PULSE WIDTHS ARE IMPLIED.
2. HIGH IS TRUE UNLESS SIGNAL PRECEDED WITH (-) THEN LOW IS TRUE.

Figure 4-2 General Block Diagram

4.9 INITIATING A PRINT CYCLE

To initiate a Print Cycle, the printer must be On-Line (ON LINE/OFF LINE switch in ON LINE), paper should be under the print drum, the MANUAL PAPER FEED should not be depressed, and the EXTERNAL PAPER FEED line should be inactive. The output device will sample the LOCK-OUT line and if the line is inactive the output device will put data on the data lines and generate PRINT COMMAND. PRINT COMMAND will strobe the data into the buffers and generate LOCK-OUT. When the LOCK-OUT line is active, the output device may release the data lines and drop PRINT COMMAND. The data and instruction are now stored by the printer.

4.10 PRINT CYCLE

Once the Instruction F/F is set by the PRINT COMMAND, the Print F/F will set when INSTR, $\overline{\text{PAPER FEED}}$, and STEP are active simultaneously. PR (Print F/F set) activates the Scan Counter, which counts every STEP time until all the character positions have been scanned once. The Character Code Counter counts from 0 to 15 incremented with every STEP time and compares this binary code with the Data F/F's through the comparator circuitry. The Printer Actuator will be driven when GPR and the comparators output are active. As the Scan Counter reaches a count of 16, SCAN COMPL activates and resets the Print F/F terminating the Print Cycle. The Print Cycle is approximately 27 milliseconds in duration.

4.11 PAPER FEED CYCLE

When the Scan Counter reaches a maximum count, the Print F/F is reset, LOCK-OUT is dropped (inactive), and a delay flop is activated. The Print F/F reset terminates the Print Cycle, LOCK-OUT inactive enables strobing of data into the buffers, and the delay flop activates the Paper Feed Motor. The

printer stores the new data and sets the Instruction F/F. When the delay flop goes inactive, INSTR sets the Print F/F at the next STEP time to initiate a new Print Cycle. The Paper Feed Cycle is approximately 23 milliseconds in duration.

4.12 DATA INPUT

Each column of a Model 2016 printer contains a five (5) bit buffer. The input data is presented by the output device in a character and bit parallel fashion. A Print Command given by the output device, will generate a PRC signal on the Control Board. PRC ripples through the column driver boards (5 boards for 20 columns) and generates signals which clear and load the buffers. Specifically, when PRC has rippled through all the column driver boards, it is returned to the Control Board where it sets the Instruction F/F (INSTR FF). In turn the Instruction F/F set generates LOCK-OUT. The leading edge of LOCK-OUT allows the buffers to lock.

4.13 COLUMN INHIBIT

(See Table 4-1).

The fifth bit position for each column is the Column Inhibit bit. A logic "1" on the Column Inhibit line transferred into the buffers will prevent that column from printing for that particular line of print. There exists a Column Inhibit bit position for each column of print and the sense of each Column Inhibit bit can be altered with each new line of data. Therefore the format of each line of print is programmable by the output device.

NOTE

The column inhibit lines cannot be left open. If the output device

has no provisions for controlling the column inhibit lines, they must be connected to a logic zero level. That is if (+) positive logic is used, the inhibit lines must be connected to zero (0) volts, or if (-) negative logic is used the lines must be connected to +5 volts.

4.14 ZERO SUPPRESS

(See Table 4-1).

Zero Suppress is controlled for each column by use of slide action switches located behind the front access panel. One position of the switch allows the Zero Suppress function to operate and the other position inhibits the function by blocking the Zero Detection Gate. In the Zero Suppress inhibit position the switch re-starts a Zero Suppress field in the next least significant column position. This feature allows variable Zero Suppress fields within the line of print.

Table 4-1 Zero Suppress and Column Inhibit

COLUMN POSITION	1	2	3	4	5	6	7	8	9	10
Zero Suppress Switch Inhibit Occurs in Up Position of Switch		X	X	X	X			X	X	X
Data Buffer	0	0	2	0	0	0	0	0	0	1
Column Inhibit Buffer	0	0	0	1	1	0	0	0	0	0
Print Line		0	2					0	0	1

Note that the zero suppress switch in column 5 is in the inhibit position to restart the zero suppress field in column 6.

4.15 COMPARATORS

Each column print actuator has an associated driver and comparator. The inputs to the comparator circuit are the Data Buffers, the outputs of the Character Code Counter, the output of the Zero Detection Gate, the associated Column Inhibit Buffer, and GPR. GPR inhibits the comparator circuit during STEP time when the Character Code Counter is in the transitional state of stepping from one count to the next. The only conditions that will activate the drivers to print are during a Print Cycle, between STEP times, a compare (Character Code Counter with Data F/F), no Column Inhibit and no Zero Suppress.

4.16 EXTERNAL AND MANUAL PAPER FEED

External Paper Feed is controlled by the output device. Its active state is at zero (0) volts. External Paper Feed activates the Scan Counter thereby simulating a machine Print Cycle except that printing is inhibited because the Print F/F was not set. When the Scan Counter has completed its cycle, the printer goes through the normal procedures of ending a Print Cycle and initiating a Paper Feed Cycle. Therefore it can be seen that External Paper Feeds occur at the same rate as a normal print and feed sequence. As long as the External Paper Feed line is active, the above cycle will repeat. The MANUAL PAPER FEED switch is a momentary switch located on the front panel. Depressing the switch forces the printer into the same logic sequence as described for External Paper Feed.

4.17 PRINT TEST SWITCH

The function of the PRINT TEST switch is to force a Print Cycle for testing purposes. However, it is required that the printer have data in the buffers

and a Print Command. Depressing the ON LINE/OFF LINE switch to the OFF LINE position releases the output device from the printer. Switching to Print Test will now cause the printer to continuously print the line of data contained in the input data buffers. Print test operates by continuously jamming the Instruction F/F set. The printer logic then proceeds through Print and Paper Cycle without clearing or loading the data buffers.

NOTE

If any column inhibit buffers have been set printing will not occur in those columns.

SECTION V
MAINTENANCE

5.1 INTRODUCTION

This section provides the information necessary to perform periodic and preventive maintenance, troubleshooting and repair.

5.2 MECHANICAL MAINTENANCE

5.2.1 CLEANING AIR FILTERS

There is an air filter for the printer located in the rear of the electronic section. This filter should be cleaned in warm soapy water at least once every 40 operating hours.

5.2.2 PRINT DRUM DRIVE MOTOR LUBRICATION

(See Figure 5-1).

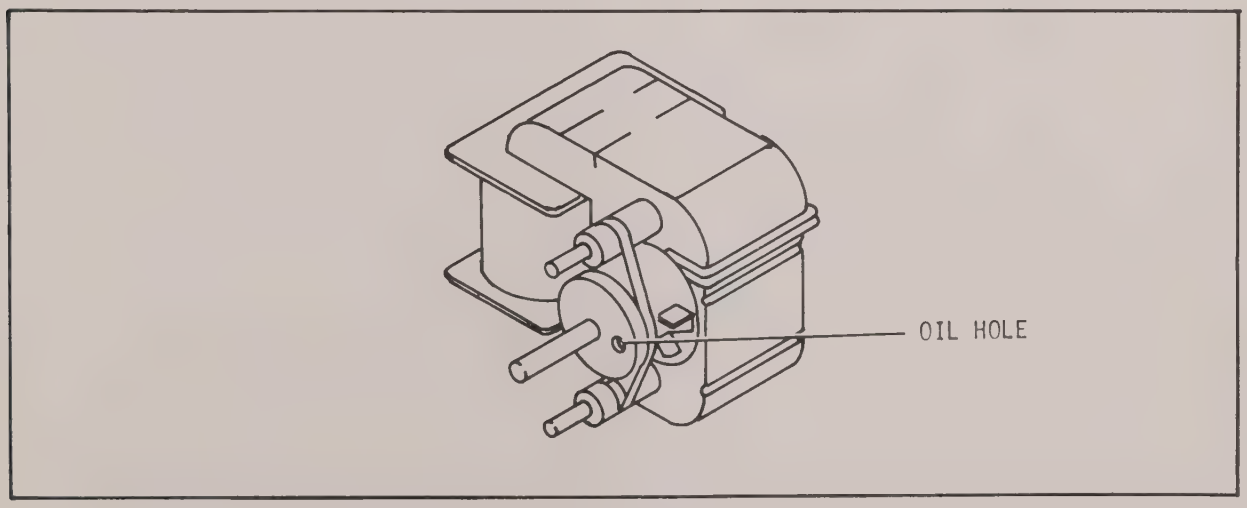


Figure 5-1 Print Drum Motor Lubrication

The main drive motor should be lubricated once every 3 months with a good quality instrument oil. The oil should be placed on the felt packing of

each bearing by the following procedure:

(1) Unplug the main power cord.

(2) Remove the ribbon mechanism and cover.

(3) Place instrument oil in the bearing hole on both sides of the motor.

CAUTION

Do not over lubricate.

5.2.3 RIBBON MECHANISM LUBRICATION (UNITS WITH RIBBON OPTION)

(See Figure 5-2).

The ribbon mechanism should be lubricated once a year following this procedure:

(1) Unplug the ribbon mechanism connector.

(2) Remove the ribbon.

(3) Remove the ribbon mechanism.

(4) Place instrument oil in the bearing hole (armature side only) for both motors.

CAUTION

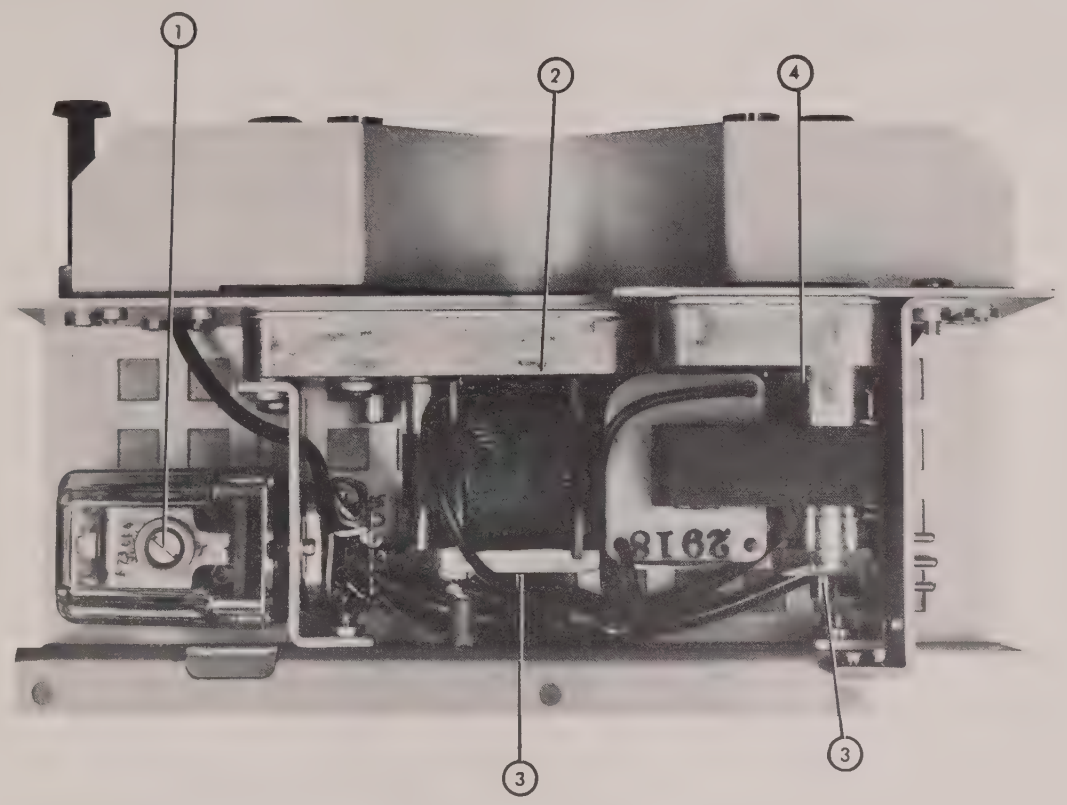
Do not over lubricate.

5.2.4 RIBBON LIFE (UNITS WITH RIBBON OPTION)

The inked ribbon should be changed approximately every 160 hours of printing time.

5.2.5 PRINT DRUM CLEANING

To clean the Print Drum follow this procedure:



1. Relay
2. Clockwise Motor
3. Armature Side Lubricating Holes
4. Counter Clockwise Motor

Figure 5-2 Ribbon Mechanism Lubrication

(1) Remove the inked ribbon from the drum cover.

(2) Remove the drum cover which is held in place by one Allen head screw.

(3) The print drum is keyed in position by a single Allen head screw located in one of the three holes in the far side of the code wheel. Identify this hole with a mark prior to removing the screw. This will assure the same character location on the drum

when reassembling.

(4) Remove the drum mounting screw, and slide the drum carefully off the shaft.

(5) Clean the drum with chlorethane and a typewriter brush to remove all foreign matter from the face of the drum.

(6) Prior to reinstalling the drum, lubricate the bore and both sides of the drum with a good quality rust-preventative oil, then reassemble the mechanism and replace the ribbon.

CAUTION

Care should be taken while installing the print drum on the shaft because of the close tolerance fits.

5.3 MECHANICAL MALFUNCTIONS AND ADJUSTMENTS

5.3.1 PAPER HANDLING

A variety of problems arise when the paper supply or feed system malfunctions. Primarily the format of print will be erratic; for example, the lines and columns of print may not be straight or spacing between characters will not be uniform. To determine whether the failure is electrical or mechanical, replace the Logic Control Board with a spare. If the problem continues once the board is replaced a mechanical malfunction is most likely the problem.

5.3.2 PAPER DRAG

Check the drag on the paper motion by depressing the Paper Release Lever and pulling the paper forward by hand. The force necessary to pull the paper forward is approximately 45 grams. Excessive drag may be caused by using

paper wider than the track guide area, improperly threaded paper (outside the paper guides), improper brush adjustment, improper tension in the paper advance mechanism or improper paper tracking.

5.3.3 PAPER THREADING

Verify that the paper is threaded in accordance with the procedure in Section 3.6. Roll paper should be fed from the roll bottom, over the tension spring, and between the paper retainer and paper out button. Fanfolded paper is used without a tension spring in the printer, fed from the top of the pack, and threaded the same as the rolled paper. If the paper is threaded above the paper retainer, the paper out switch will not be actuated, thus inhibiting the printer from printing.

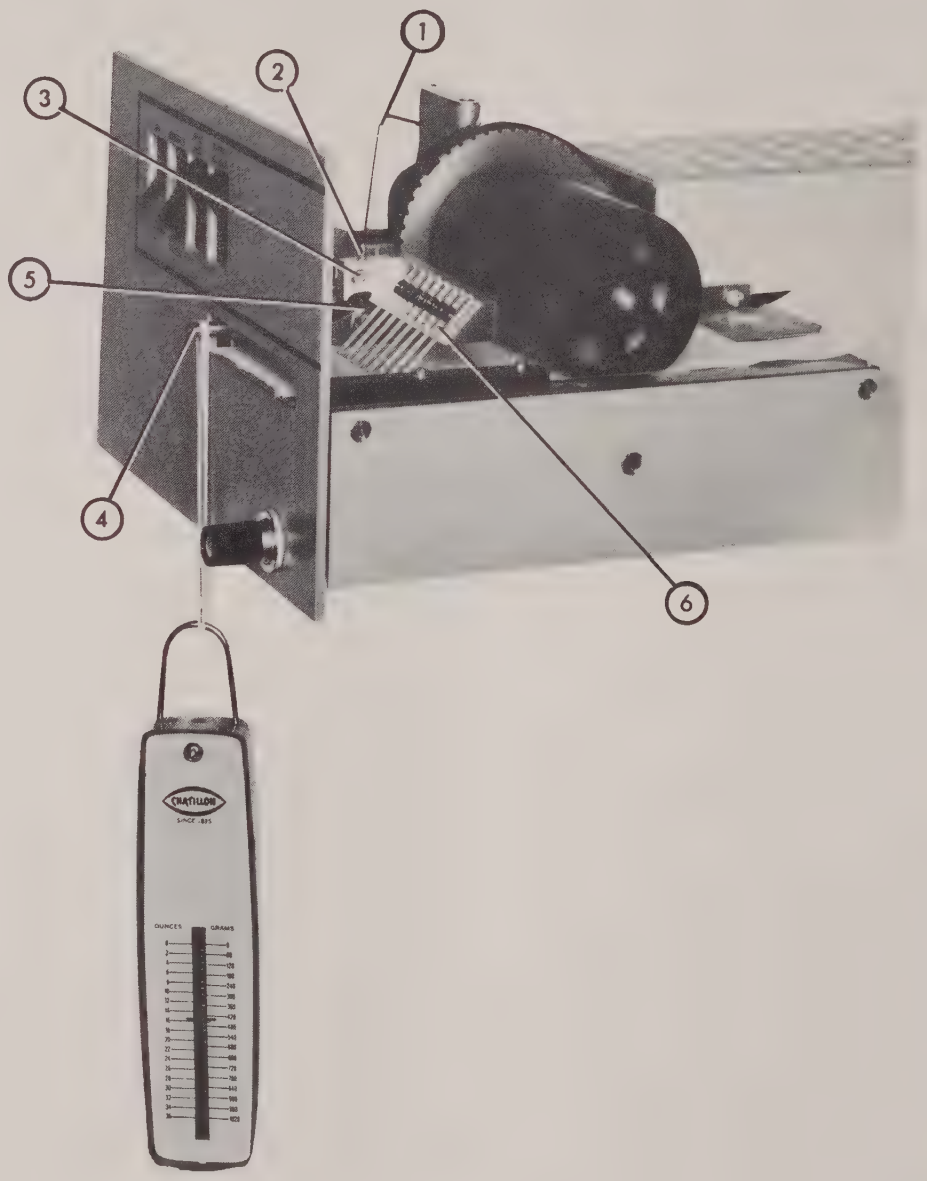
5.3.4 PAPER RAKE ADJUSTMENT

If the paper can be moved backward against the Paper Rake Assembly the rake is not set properly. To adjust this assembly remove the paper, loosen the set screw and rotate the Paper Rake Assembly so that the rakes just touch the paper tray. All the rakes should contact the paper table evenly without being bowed. If an individual rake wire is not straight or does not touch the paper tray, loosen its retaining screw, adjust the rake wire until it just touches the paper table (no paper underneath the rake), and tighten the retaining and set screws. After the paper rake is adjusted rethread the paper as in Section 5.3.3.

5.3.5 PAPER ADVANCE MECHANISM ADJUSTMENT

(See Figure 5-3).

Improper tension causes uneven spacing of printed lines. The tension screw



1. 5/64" Allen Tool
2. Idler Pressure Adjustment
3. Paper Rake Adjustment Screw
4. PAPER RELEASE
5. Idler Wheel
6. Rake Wires

Figure 5-3 Paper Advance Adjustments

on the Paper Advance mechansim controls the pressure between the driver and idler wheels. This tension may be checked as follows:

(1) Turn the POWER OFF, remove the dust cover from the mechanism and attach a spring scale to the Paper Release Lever.

(2) Turn the POWER ON and operate the printer at its maximum printing speed. Apply enough force to the spring scale to stop the paper from advancing. This force should be between 30-35 ounces.

(3) If adjustment is required, adjust the tension screw with a 5/64" Allen wrench until the printed character line advance measures 6 lines per inch.

5.3.6 PAPER TRACKING ADJUSTMENT

If the paper tends to skew against the guides, excess paper drag or wrinkling may occur. This indicates that the paper tracking is out of adjustment. The adjustment procedure is as follows:

(1) Loosen the pivot and mounting screws (see Figure 5-4).

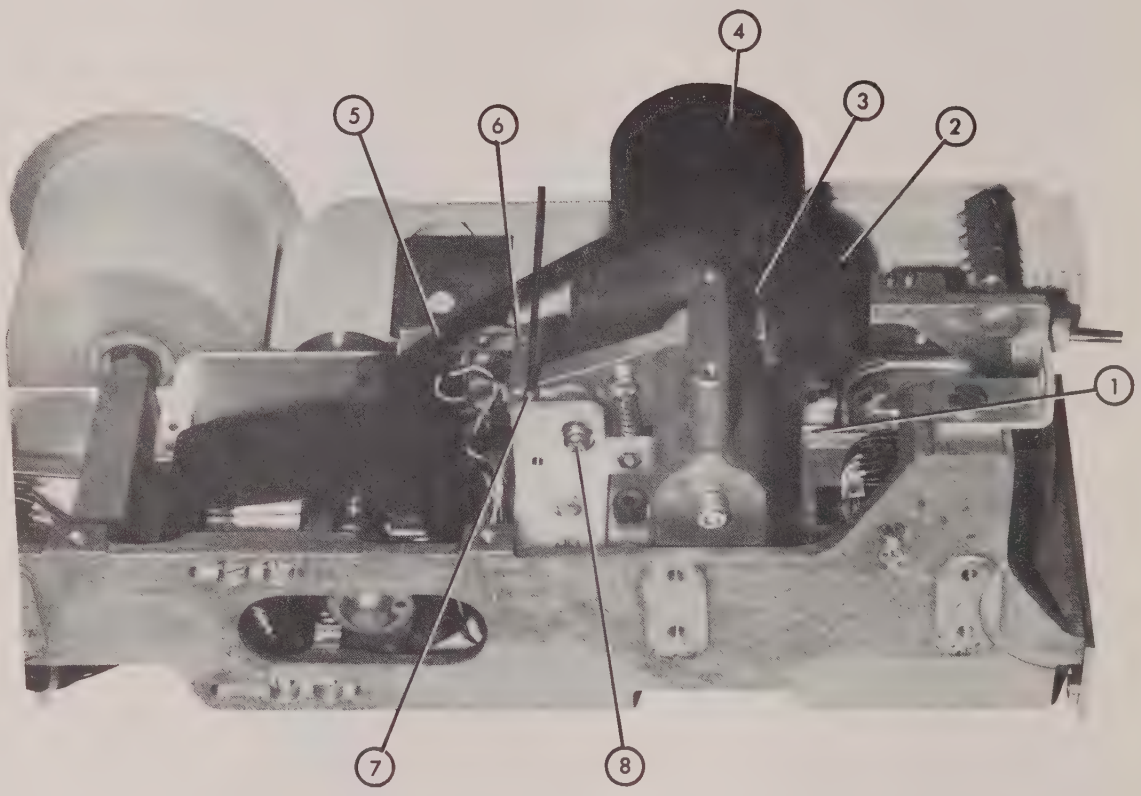
(2) Operate the printer so that the paper advances through the mechanism.

(3) Track the paper correctly between the guides by moving the Paper Tracking mechanism horizontally about its pivot. The paper should be evenly spaced between the guides.

(4) Tighten the pivot and mounting screws.

5.3.7 PRINTER PHASING

If the printer is out of phase, an examination of several print samples will reveal that a line of printed characters is consistantly shifted a distance equivalent to a fraction or multiple of character pitch.



1. Pivot Mounting Screw (Tracking)
2. Code Wheel
3. Drum Key Screw (in counter bore hole)
4. Drum Cover
5. Drive Belt
6. Magnetic Pickup
7. Phasing Adjustment Screw
8. Phasing Lock Screw

Figure 5-4 Phasing

5.3.8 LINE PHASING

A full line phasing adjustment is required when all of the columns print the correct characters, but either the top or bottom of another line of characters also shows on the print line. Check the input voltage and frequency to

the printer. The instrument was aligned at the factory for 115 volts, 60Hz; 105 volts or less input will cause the print drum to rotate at less than 720 RPM and cause misalignment to some extent. Check for undue drag on the drum shaft by examining the drive belt and all other associated parts. Pieces of paper, large accumulations of paper dust or excessive dirt could cause the drum to rotate at less than 720 RPM.

5.3.9 PHASING ADJUSTMENT

(See Figure 5-4).

If a phasing adjustment is required, it is performed by advancing or retarding the magnetic pickup about its pivot. If the top portion of a line of characters appears under the selected line of print, loosen the locking screw approximately one turn, turn the adjusting screw counterclockwise one or two turns, retighten the locking screw and operate the printer to see if this is corrected. Conversely, if the bottom portion of a line of characters appears above the line of print, turn the adjusting screw in a clockwise direction to correct the condition. Repeat the adjustments until the condition is corrected and be sure that the locking screw is tightened when the adjustments are completed.

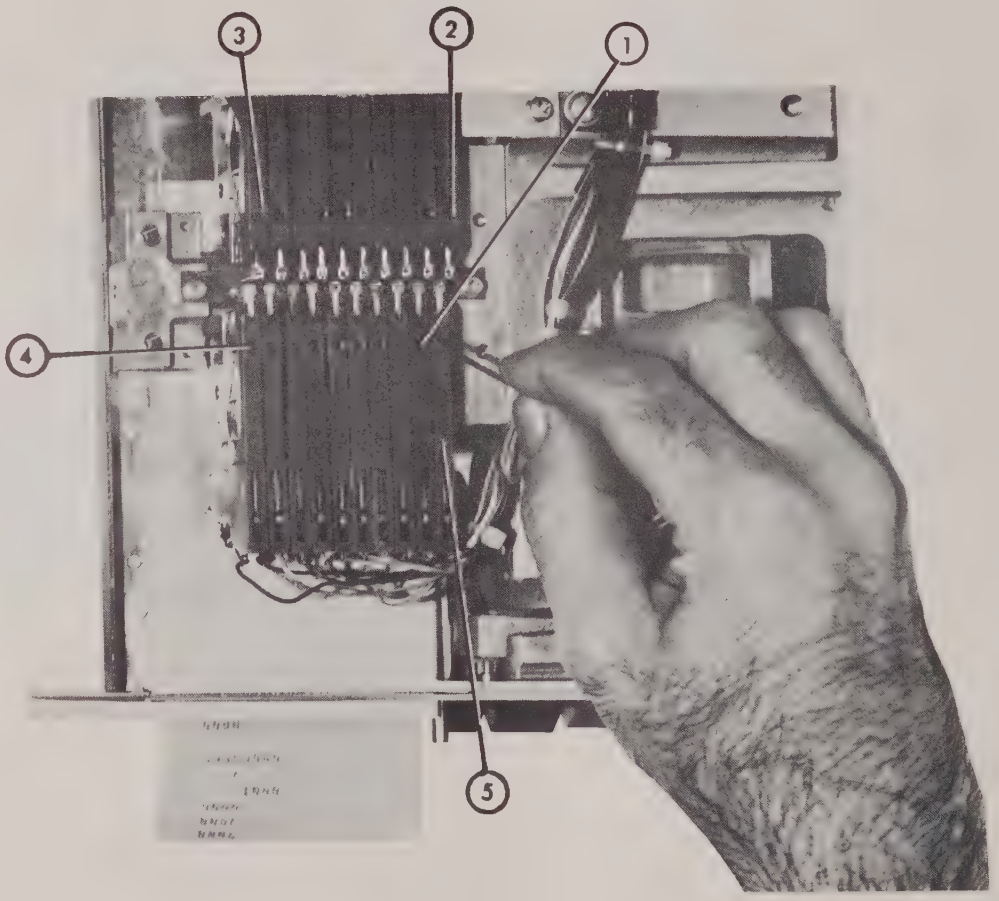
CAUTION

Make all phasing adjustments with the POWER turned OFF.

5.3.10 COLUMN ADJUSTMENT

(See Figure 5-5).

Column adjustment is provided by a screw located at the base of each column



1. Actuator Adjustment for Column 4
2. Actuator for Column 1
3. Actuator for Column 19
4. Actuator for Column 20
5. Actuator for Column 2

Figure 5-5 Column Adjustment

actuator. An individual column needs adjustment if the character in that column consistantly prints either higher or lower than the line of print. To determine which column needs the adjustment count the columns from left to right on the printed paper. When the column is determined the actuator may be found by counting from right to left. The adjustment screw should be turned counterclockwise if the printed character is to be moved up or clockwise if the printed character is to be moved down. Only a slight adjustment is necessary. Approximately 10° to 15° is usually sufficient.

CAUTION

A clockwise adjustment of 180° or more will jam and destroy the solenoid and possibly the print drum.

5.3.11 MAGNETIC PICKUP GAP ADJUSTMENT

If it is necessary to adjust the magnetic pickup (see Figure 5-4) to synchronize hammer firing (timing), insert a #7/64 Allen wrench through the air vent hole in the Dust Cover or Ribbon Reverse Assembly, which is directly over the #6-32 setscrew in the magnetic pickup arm. Untighten setscrew and place a .007" shim between the magnetic pickup and the teeth of the driven timing sprocket. Set gap of .007" by moving magnetic pickup toward timing sprocket and tighten setscrew.

NOTE

Do not rotate magnetic pickup during adjustment; the protruding core of pickup must be parallel to teeth of code wheel. If the elongated core of the magnetic pickup is not parallel to the code wheel teeth, the timing will be either late or early.

5.4 ELECTRONIC MALFUNCTIONS

The unit is completely composed of TTL integrated electronic circuits, therefore the electronic part of the printer is relatively trouble free. However, if repair is necessary a thorough understanding of the operation will be an invaluable aid to locating trouble spots. Therefore, it is recommended that Theory of Operation (Section IV), Maintenance (Section V), and Circuit Diagrams and Logics (Section VI) be read and understood before attempting repair.

CAUTION

Never remove or insert a printed circuit card unless all POWER is turned OFF or severe damage to components will result.

5.4.1 SERVICE AIDS AND TEST EQUIPMENT

The following is a list of recommended equipment:

(1) Sensitive multimeter, voltmeter, or equivalent.

(2) Oscilloscope with one microsecond resolution and a calibrated timed base.

(3) One extender board.

(4) One set of spare printed circuit cards.

(5) Data source.

5.5 FUSE LOCATION AND FUNCTIONS

5.5.1 MAIN POWER FUSE

This fuse is located on the rear panel of the printer (see Figure 2-1). It is in the main AC line and carries the entire printer load. This fuse is rated for 4 amps at 115 volts.

5.5.2 POWER SUPPLY FUSES

There are two fuses located on top of the power supply; one in series with the +5 volt output (6 amp) and one in series with the +38 volt output (6 amp). Both are type "3 AG".

5.5.3 HAMMER SOLENOID FUSES

Ten fuses are mounted on a plug-in card for protection of the solenoids. Each fuse is a 5/10 amp SB (3 AG) and protects two solenoids.

5.6 POWER SUPPLY

The power supply consists of two DC voltage outputs; +38 volts and +5 volts. The +38 volts supply is used for paper movement and printing action and the +5 volts supply is used throughout the logic circuits. Both supplies are regulated 5%.

5.7 TROUBLESHOOTING

5.7.1 REFERENCE TABLE

The troubleshooting reference table (see Table 5-1) reflects some of the more common problems and should be used in conjunction with other text in this manual. Some unusual problems may occur and the suggested procedure for this is to follow a logical sequence starting from the simplest to the more complicated causes.

Table 5-1 Troubleshooting Reference Table

MALFUNCTION SYMPTOM	CAUSE OF MALFUNCTION	REPAIR INSTRUCTIONS
Printer not operating; power light on control panel off; motors of printer mechanism not rotating.	a - Main power fuse out.	a - Replace fuse.

Table 5-1 Troubleshooting Reference Table (Cont'd)

MALFUNCTION SYMPTOM	CAUSE OF MALFUNCTION	REPAIR INSTRUCTIONS
No print; green and panel lights on; paper in printer.	a - Paper threaded over paper retainer instead of under it.	a - Rethread paper correctly; Section 5.3.3.
Ribbon reverse mechanism not operating.	a - Microswitch malfunctioning or bent actuator lever. b - Malfunction of relay or clutch motor.	a - Replace microswitch if defective or straighten lever if bent. Lever should actuate microswitch as ribbon bar approaches. b - Check relay and motor.
Wrong characters printing in one or more columns.	a - Wrong input code. Mating input connector improperly wired. b - Circuit failure in logic control board. c - Input data lines changing during strobe into buffers.	a - Check input connector list, Section VI. b - Replace logic control board with a spare. c - Refer to print command and lockout signals.
Wrong characters printing in all columns.	a - Print drum position out of phase relative to timing wheel.	a - Adjust phasing, Section V, full line adjustment.
Spacing of character lines is erratic and columns are not straight.	a - Paper loaded improperly. b - Paper tracking out of adjustment (paper not centered).	a - Load paper according to Section III. b - Readjust according to Section V.

Table 5-1 Troubleshooting Reference Table (Cont'd)

MALFUNCTION SYMPTOM	CAUSE OF MALFUNCTION	REPAIR INSTRUCTIONS
	c - Improper tension on release lever of paper advance mechanism.	c - Readjust according to Section V.
	d - Malfunction of Logic Control board.	d - Replace Logic Control board with a spare.
Clipping of characters in all columns.	a - Line voltage below tolerance.	a - Investigate power source.
	b - Drag on rotating print drum or drive system.	b - Examine for foreign objects interferring with motion.
	c - Print drum position out of phase relative to timing wheel.	c - Readjust according to Section V.
Paper not centered in guide rails.	a - Paper advance mechanism is misaligned causing the paper to track improperly.	a - Readjust according to Section V.
Paper not stepping.	a - Paper loaded improperly.	a - Load paper according to Section III.
	b - Paper tension spring bent.	b - Replace paper tension according to Section V.
	c - Improper tension on release lever of paper advance mechanism.	c - Readjust according to Section V.
	d - Circuit failure on the Logic Control board.	d - Replace control board with a spare.

Table 5-1 Troubleshooting Reference Table (Cont'd)

MALFUNCTION SYMPTOM	CAUSE OF MALFUNCTION	REPAIR INSTRUCTIONS
No print; green power light on; motors of printer mechanism running.	a - Printer not receiving print command.	a - Check interface connections.
	b - Column inhibit line activated. Failure of Logic Control board, or any one of the column driver boards.	b - The column inhibit lines should normally be at the logic zero level. Note, that if the column inhibit lines are not used they should not be left opened, but connected to the logic zero voltage.
	c - Column driver board improperly placed.	c - Verify column driver boards are properly seated. Refer to operation of DST signal.
One or more columns not printing.	a - Fuse out in fuse board (two odd or two even columns not printing).	a - Replace fuse.
	b - Mating input connector improperly wired.	b - Check pin connections according to Input Chart, Section VI.
	c - Malfunction in column driver board circuitry.	c - Swap column driver boards and note if non-printing column follows board.

5.8 RECOMMENDED SPARE PARTS

The recommended spare parts for the Model 2016 High Speed Printer are listed in Table 5-2.

Table 5-2 Recommended Spare Parts List

ITEM NO.	DESCRIPTION	PART NUMBER
1	Motor - Drum Drive (034040002 50 Hz)	034058601

Table 5-2 Recommended Spare Parts List (Cont'd)

ITEM NO.	DESCRIPTION	PART NUMBER
2	Motor - Paper Stepping	327000701
3	Motor - Ribbon Reverse - Front	034058302
4	Motor - Ribbon Reverse - Rear	034058301
5	Relay - Ribbon Reverse	384001101
6	Microswitch - Ribbon Reverse and Paper Out	416104002
7	Drive Belt - Print Drum	530000801
8	Drive Wheel - Paper Stepping	034058701
9	Paper Rake	034044600
10	Magnetic Pickup	034059701
11	Hammer	034058501
12	Solenoid Assembly	034058401
13	Lamp Bulb - On/Off and Paper Out	034044400
14	Paper-Roll (Per Carton of 50)	034059501
15	Paper-Fanfold (Per Carton of 24)	034059401
16	Paper Action R Ink Impregnated (Per Carton of 25)	034059601
17	Board Assembly - Logic Control + Logic	034041701
18	Board Assembly - Logic Control - Logic	034041702
19	Board Assembly - Column Driver + Logic	034041601
20	Board Assembly - Column Driver - Logic	034041602
21	Board Assembly - Fuse Card	034042901
22	Board Assembly - Extender Card	034051401
23	Fuse - Power Supply + Voltage 6 Amp	203130017
24	Fuse - Power Supply - Voltage 6 Amp	203130017
25	Fuse - Line 4 Amp	203130015

Table 5-2 Recommended Spare Parts List (Cont'd)

ITEM NO.	DESCRIPTION	PART NUMBER
26	Fuse - Fuse Board Assembly 5/10 Amp SB (3AG)	203132001
27	Contact Block - Input, 75 Position - Pins	145004902
28	Contact Pins - Input #24/26 Wire	146001401
29	Hood - Contact Block - 75 Position	145004802

NOTE

Spares should be ordered direct from the factory.

Area 215-265-7700
Spares Department

SECTION VI
CIRCUIT DIAGRAMS AND LOGICS

6.1 GENERAL

This section contains reference diagrams and schematics for the 2016 Printer with an explanation for locating specific elements within the circuits on the printed circuit boards.

6.1.1 LOGIC DIAGRAMS

The logic notation used is Military Standard 806B "GRAPHIC SYMBOLS FOR LOGIC DIAGRAMS".

6.1.2 INTEGRATED CIRCUIT PACKAGES

IC packs are numbered according to row and column location on each printed circuit board drawing (see Figure 6-3). Columns are designated by letters and rows are designated by numbers, therefore the IC pack mounted in the lower left-hand corner of this board (see Figure 6-3) is pack D6.

6.1.3 LOGIC ELEMENTS

Logic diagram elements are designated by IC pack location and pin numbers for that pack, therefore the triple input AND gate at co-ordinates 6D, (see Figure 6-2) is located in IC pack C3, pin numbers 3, 4, and 5 for the inputs and pin number 6 for the output on board number 034041700.

6.1.4 PLUG-IN BOARDS

Seven plug-in circuit boards are used in the 2016 Printer. Five of the boards are column driver circuits and the other two are the logic control circuit and the solenoid fuse board.

VIEW PRINTER

PC BOARD LOCATION DIAGRAM

VIEW PRINTER

MODEL 2016	X	FUSE CARD	X	X	CD 1-4	CD 5-8	CD 9-12	CD 13-16	CD 17-20	X	CONTROL LOGIC
MODEL 2017	X	FUSE CARD	CD 1-3	CD 4-6	CD 7-9	CD 10-12	CD 13-15	CD 16-18	CD 19-20	X	CONTROL LOGIC
MODEL 2018	X	FUSE CARD	CD 1-5	CD 6-10	CD 11-15	CD 16-20	SRC	SR	SR	X	CONTROL LOGIC
MODEL 2019	FUSE CARD	CD 1-4	CD 5-8	CD 9-12	CD 13-16	CD 17-20	SRC	SR	SR	SR	CONTROL LOGIC
CARD POSITION	11	10	9	8	7	6	5	4	3	2	1

X = EMPTY CD = COLUMN DRIVER SR = SHIFT REGISTER

ZERO SUPPRESSION - SWITCHES MUST BE IN DOWN POSITION

Figure 6-1 P.C. Board Location

6.2 INTERFACING WIRING

Included in this section is a pin connector table for the interface connectors. This listing presents the pin numbers and signals for each connector.

Table 6-1 Logic Diagrams and P. C. Boards

Figure	Title	Sheet No.
034041500	Logic Diagram Control Logic	1
034041701	Assembly Control Board	
034040600	Column Driver, Columns 1 thru 4, Sheet 1	2
034040600	Column Driver, Columns 1 thru 4, Sheet 2	3
034040600	Column Driver, Columns 1 thru 4, Sheet 3	4
034040700	Column Driver, Columns 5 thru 8, Sheet 1	5
034040700	Column Driver, Columns 5 thru 8, Sheet 2	6
034040700	Column Driver, Columns 5 thru 8, Sheet 3	7
034040800	Column Driver, Columns 9 thru 12, Sheet 1	8
034040800	Column Driver, Columns 9 thru 12, Sheet 2	9
034040800	Column Driver, Columns 9 thru 12, Sheet 3	10
034040900	Column Driver, Columns 13 thru 16, Sheet 1	11
034040900	Column Driver, Columns 13 thru 16, Sheet 2	12
034040900	Column Driver, Columns 13 thru 16, Sheet 3	13
034041000	Column Driver, Columns 17 thru 20, Sheet 1	14
034041000	Column Driver, Columns 17 thru 20, Sheet 2	15
034041000	Column Driver, Columns 17 thru 20, Sheet 3	16
034041601	Assembly Column Driver Board	
034035400	Mechanism Schematic	
034267001	Fuse Card Schematic	
034042901	Fuse Card Assembly	
034079900	Customer Input Connections Chart	
034036800	Power Supply	1
034036800	Power Supply	2
034036800	Power Supply	3
034174401	Power Supply	1
034174401	Power Supply	2

REVISIONS			
ZONE LTR	DESCRIPTION	DATE	APPROVED
B	REDESIGNED & REDRAWN PER ECN [illegible]	[illegible]	[illegible]
C	AS PER ECN 1866	[illegible]	[illegible]
D	AS PER ECN 1955 BCA SHEET	[illegible]	[illegible]
E	AS PER ECN 2232	[illegible]	[illegible]

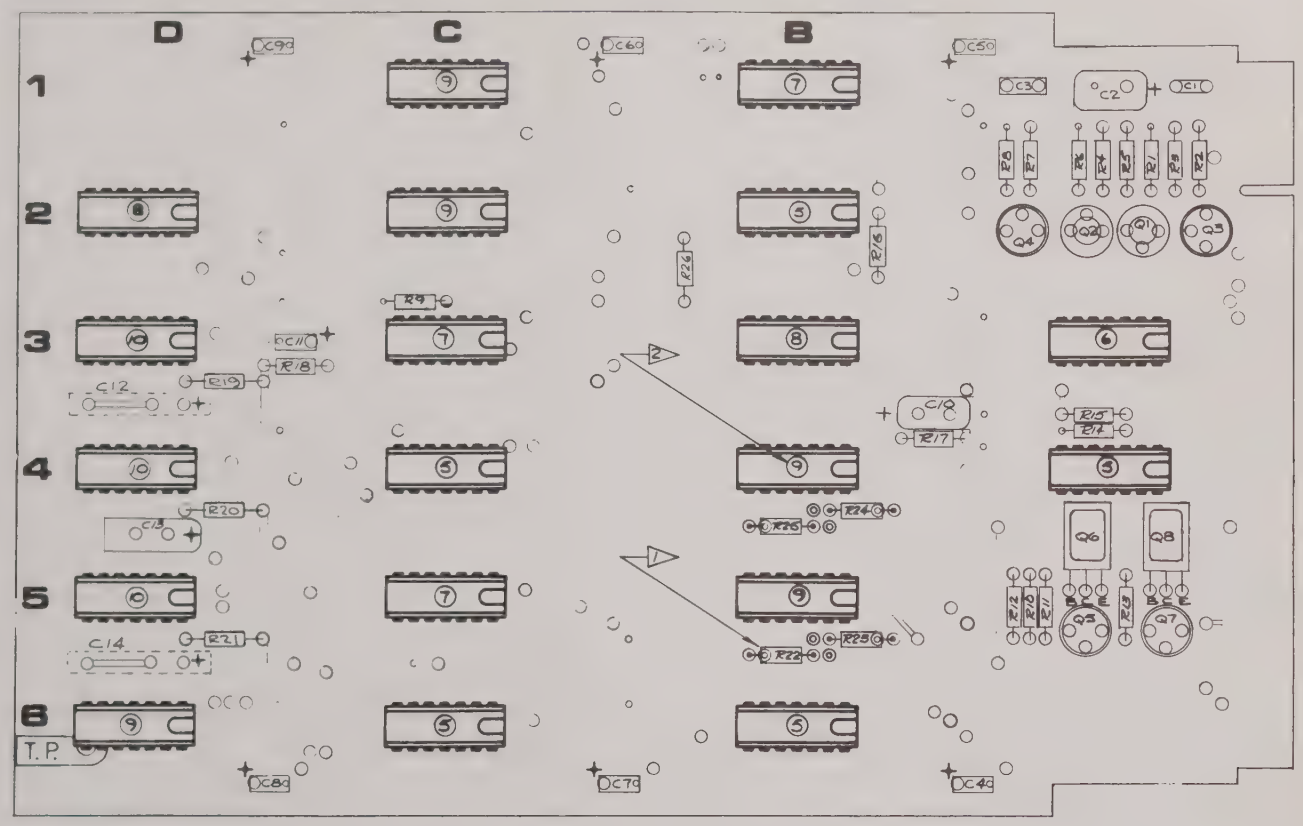
REF. DES.	COMPONENT VALUES 20 LPS.	30 LPS.
C12	.1uf, 5%	.039uf, 5%
C14	1uf, 5%	.68uf, 5%
R19	11.1K, 1%	5.11K, 1%
R20	33.2K, 1%	15K, 1%

SPARE

DO NOT SCALE PRINT

LOCATION		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: LOGIC DIAGRAM, CONTROL LOGIC POSITION 1		
DATE 11/11/71	REV. E	DRAWING NO 034041500

D 034041500 REV E



NOT USABLE		USABLE		MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.			
REVISION (S)	UPDATE WITH	REVISION (S)	P. C. N.#	TITLE CONTROL BOARD ASSEMBLY			
				PART NUMBER	EQUIPMENT USED ON	MODULE LOCATION	REV.
				03404170I	2016		F

COMPONENT DESCRIPTION		PART NUMBER
RES. 2.70 OHM 1/4W, 10%		387000001
RES. 56 OHM 1/4W, 5%		387000017
RES. 100 OHM 1/4W, 10%		387000020
RES. 240 OHM 1/4W, 5%		387000098
RES. 330 OHM 1/4W, 5%		387000026
RES. 1K 1/4W, 5%		387000032
RES. 1K 1/4W, 10%		387000032
RES. 4.7K 1/4W, 5%		387000040
RES. 5.6K 1/4W, 10%		387000041
RES. 5.9K 1/4W, 1%		387101267
RES. 5.11K 1/4W, 1%		387101261
RES. 11.1K 1/4W, 1%		387101293
RES. 15K 1/4W, 1%		387101306
RES. 15K 1/4W, 10%		387000046
33.2K 1/4W, 1%		387101339
TRANSISTOR	INSULATOR	438000101
"	"	438000102
"	2N3565	436004601
"	2N3569	436000501
"	2N3638	436402001
"	2N5191	436004901

COMPONENT DESCRIPTION		PART NUMBER
CAP. .039uf 5%		134006403
CAP. .05 uf 10%		134006816
CAP. .68 uf 5%		134006404
CAP. .1 uf 5%		134906010
CAP. .1 uf 20%		134007301
CAP. 1. uf 5%		134906010
CAP. 2.2 uf 5%		134906012
CAP. 10 uf 20%		134007302
CAP. 15 uf 20%		134007303
CAP. 33 uf 20%		134906027
CAP. 47 uf 10%		134006806
CAP 1 UF 5%		134906008
CIR. MODULE	9601	261001401
" "	N7400	261000001
" "	N7402	261000101
" "	N7410	261000201
" "	N7430	261000401
" "	N7473	261000901

NOTES:

1. In the parts list, components are listed by component type and in value order.
2. Component values can be obtained from the Logic Drawings and/or by physically looking at the printed circuit board assembly.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
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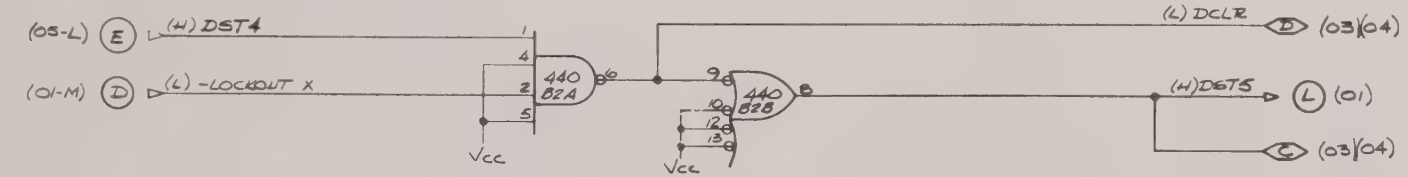
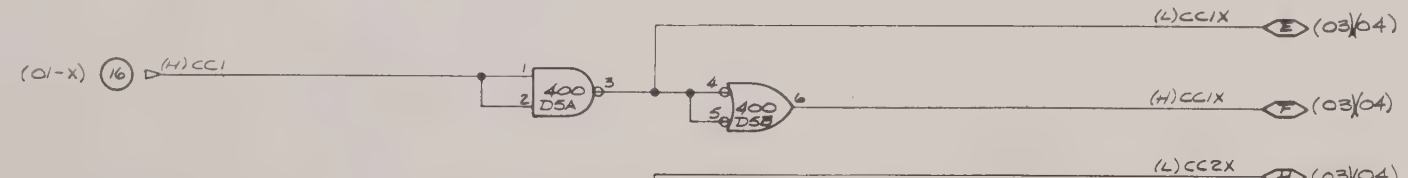
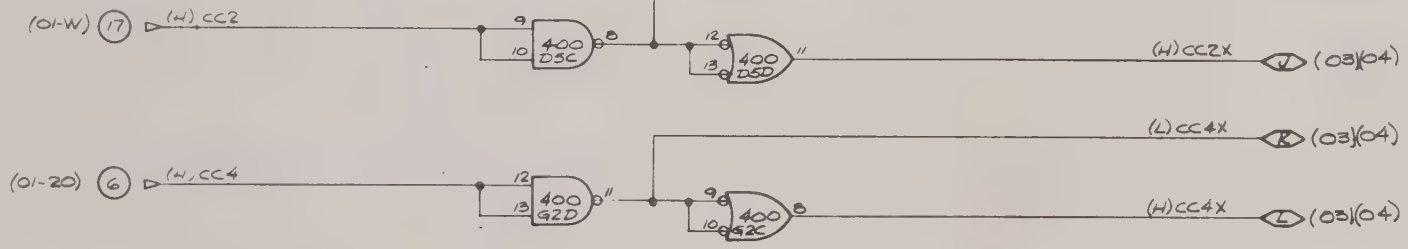
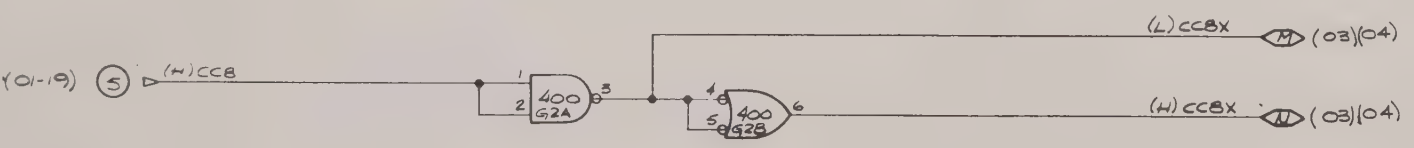
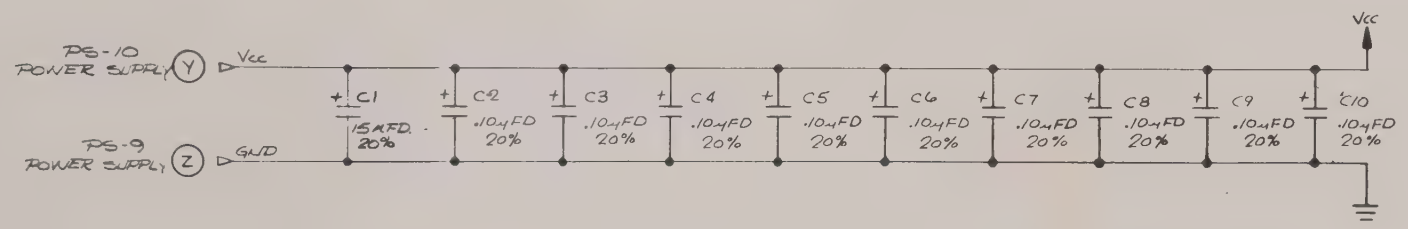
	C	ADDED CAP. C[illegible]	[illegible]	[illegible]











SYSTEM LOGIC 2 OF 16

LOCATION 7

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE: LOGIC DIAGRAM, COLUMN DRIVER, POS; 7 (COLUMNS 1 THRU 4)

DATE	REV.	DRAWING NO
11/11/71	C	034040600

D 034040600 C

DO NOT SCALE PRINT

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

(01-21) X H.GPR5

J2-34 20 D.L.1 — 400 B6B, C6A, C6B

J2-28 21 D.L.2 — 400 B6C, C6D, C6C

J2-22 19 D.L.4 — 400 B6A, D6A, D6B

J2-15 22 D.L.8 — 400 B6D, D6D, D6C

J2-8 7 COL INH. — 400 C2C, C5C, C5D

J1-67 W (H)Z.S.

R1 5.6K 10% Vcc

PROGRAMMABLE ZERO SUPPRESSION SWITCH

Vcc — S1 — COLUMN 1 / COLUMN 2

J2-73 13 D.L.1 — 400 B4B, C4A, C4B

J2-65 14 D.L.2 — 400 B4C, C4D, C4C

J2-58 12 D.L.4 — 400 B4A, D4A, D4B

J2-52 15 D.L.8 — 400 B4D, D4D, D4C

J2-46 K COL.INH — 400 C2D, C5A, C5B

(02-C) C (H)DET5

(02-D) D (L)DCLE

R2 R3 R4 R5 — 430 G6A — 400 G5C

R7 R8 R9 R10 — 430 G4A — 400 G5D

Vcc — S2 — PROGRAMMABLE ZERO SUPPRESSION SWITCH

(02·E) E (L)CC1X
(02·F) F (H)CC1X — 451 E6A

(02·H) H (L)CC2X
(02·J) J (H)CC2X — 451 E6B

(02·K) K (L)CC4X
(02·L) L (H)CC4X — 451 F6A

(02 M) M (L)CC8X
(02·N) N (H)CC8X — 451 F6B

451 E4A — 451 E4B — 451 F4A — 451 F4B

R6 R11

(H)GPR5 A (04)

430 E5A — 400 A3D — R12 100Ω — Q1 2N3569

ACTR.COL.1 T J550-X MECHANISM

Q2 2N5191 — R13 100Ω — 40 V.GND. N PS-8 POWER SUPPLY

P (04)

COLUMN 1 / COLUMN 2

430 F5A — 400 A3C — R14 100Ω — Q3 2N3569

ACTR. COL. 2 V J550-N MECHANISM

Q4 2N5191 — R15 100Ω — 40 V. GND. P (04)

(H)Z.S. B (04)

SYSTEM LOGIC 3 OF 16

D 034040600 REV

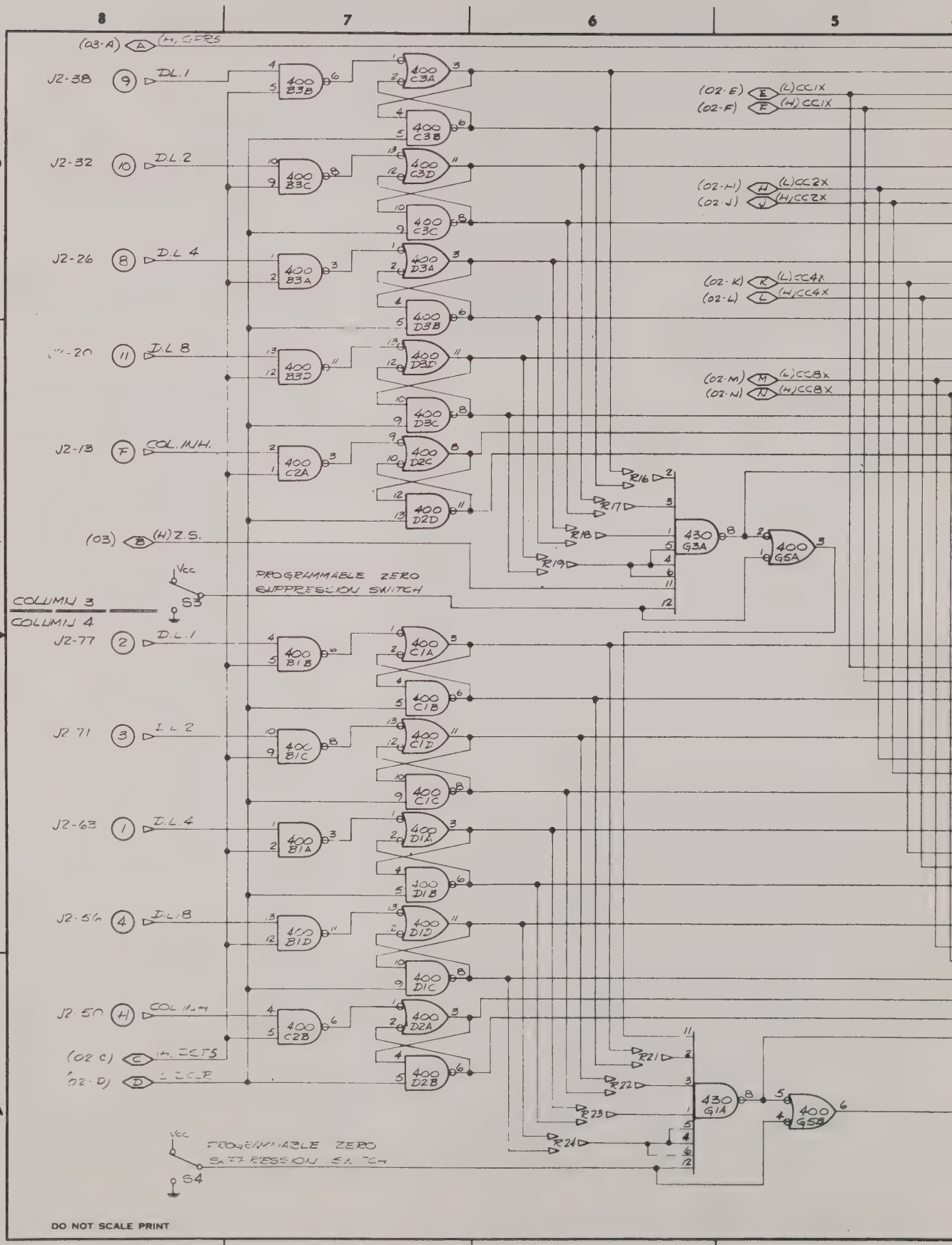
DO NOT SCALE PRINT

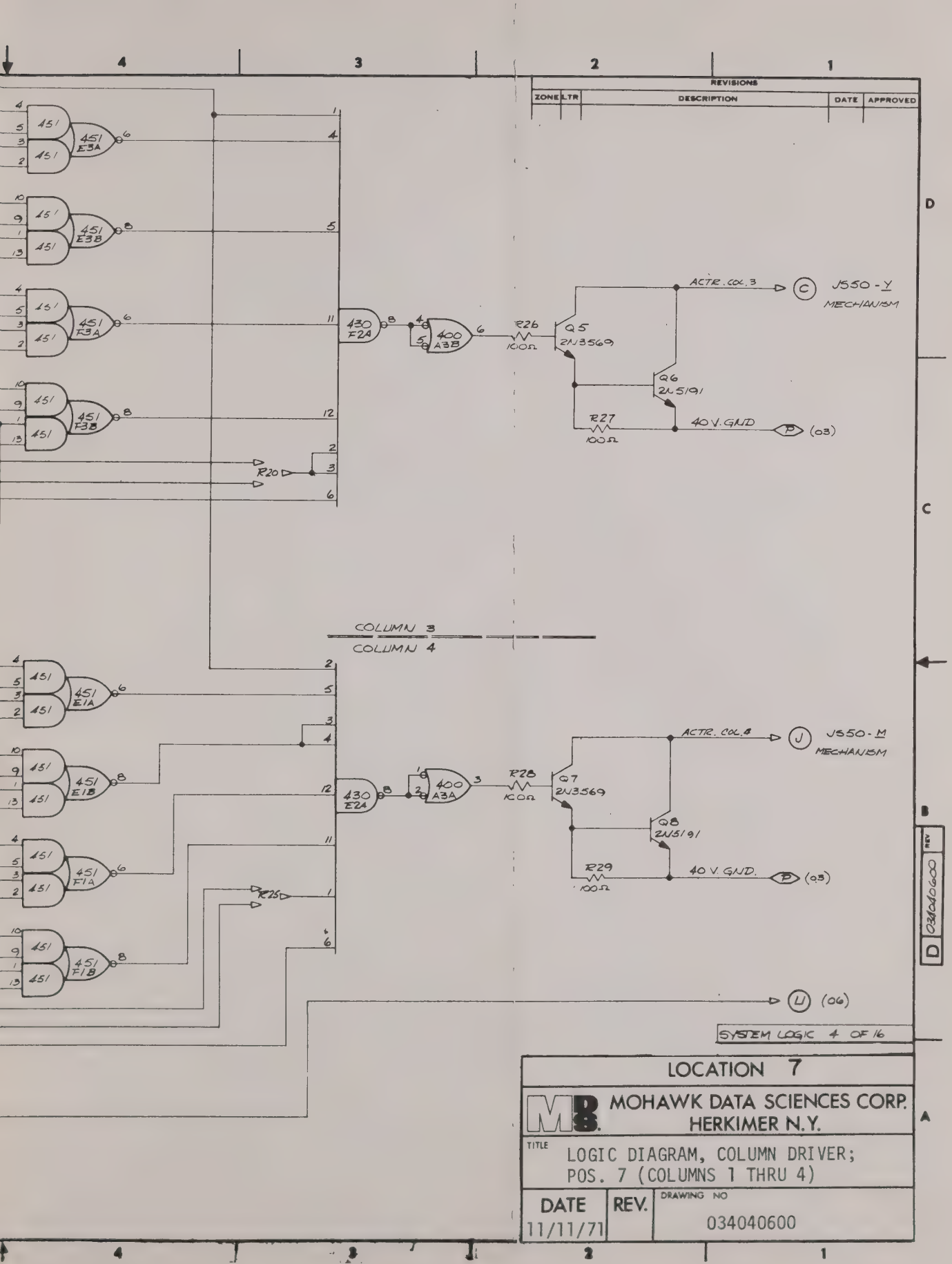
LOCATION 7

MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.

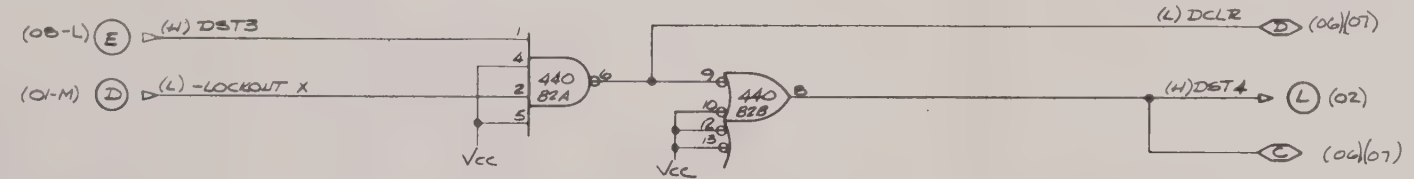
TITLE: LOGIC DIAGRAM, COLUMN DRIVER POS. 7 (COLUMNS 1 THRU 4)

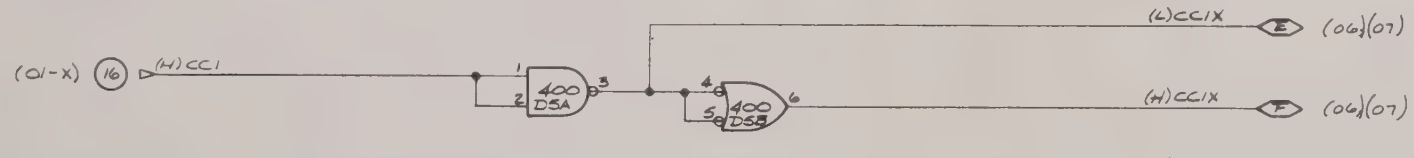
DATE	REV.	DRAWING NO
11/11/71		034040600

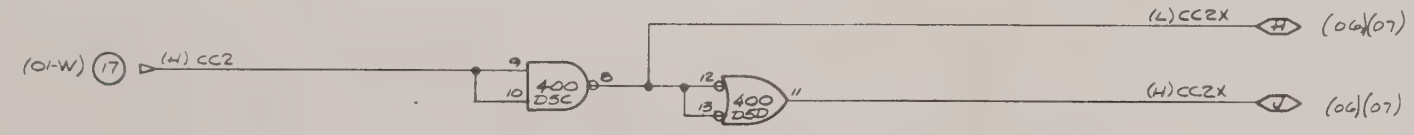

8
7
6
5
D
C
B
A
(03-A) A (H) C.FRS
J2-38 9 D.L.1
J2-32 10 D.L.2
J2-26 8 D.L.4
J2-20 11 D.L.8
J2-13 F COL.M/H.
(03) B (H) Z.S.
COLUMN 3
COLUMN 4
J2-77 2 D.L.1
J2-71 3 D.L.2
J2-63 1 D.L.4
J2-56 4 D.L.8
J2-50 H COL.M/H
(02-C) C (H) CCTS
(02-D) D (L) CCTS
(02-E) E (L) CC1X
(02-F) F (H) CC1X
(02-H) H (L) CC2X
(02-J) J (H) CC2X
(02-K) K (L) CC4X
(02-L) L (H) CC4X
(02-M) M (L) CC8X
(02-N) N (H) CC8X
400 B3B
400 C3A
400 C3B
400 B3C
400 C3D
400 C3C
400 B3A
400 D3A
400 D3B
400 B3D
400 D3D
400 D3C
400 C2A
400 D2C
400 D2D
R16
R17
R18
R19
430 G3A
400 G5A
Vcc
PROGRAMMABLE ZERO SUPPRESSION SWITCH
S3
400 B1B
400 C1A
400 C1B
400 B1C
400 C1D
400 C1C
400 B1A
400 D1A
400 D1B
400 B1D
400 D1D
400 D1C
400 C2B
400 D2A
400 D2B
R21
R22
R23
R24
430 G1A
400 G5B
S4
DO NOT SCALE PRINT
EG & SC 7 84

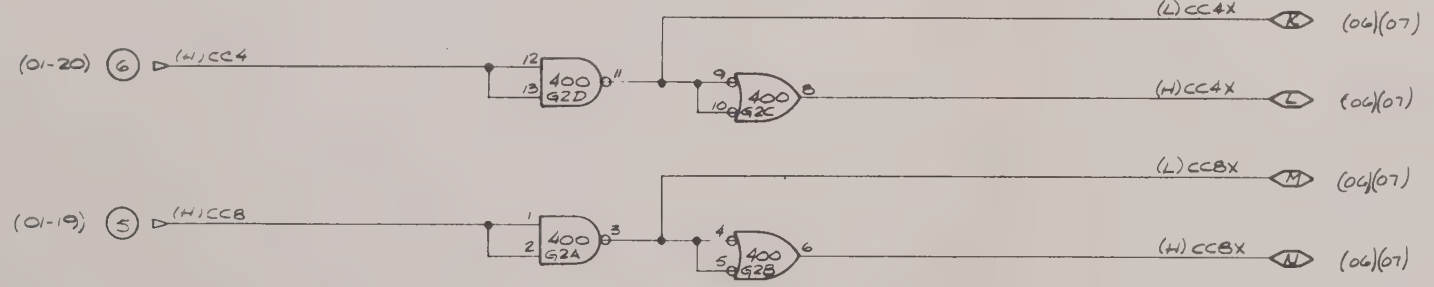

REVISIONS
ZONE LTR DESCRIPTION DATE APPROVED
451 E3A
451 E3B
451 F3A
451 F3B
451 E1A
451 E1B
451 F1A
451 F1B
430 F2A
400 A3B
R26 100Ω
Q5 2N3569
Q6 2N5191
R27 100Ω
ACTR. COL. 3
C J550-Y MECHANISM
40 V. GND
P (03)
R20
COLUMN 3
COLUMN 4
430 E2A
400 A3A
R28 100Ω
Q7 2N3569
Q8 2N5191
R29 100Ω
ACTR. COL. 4
J J550-M MECHANISM
40 V. GND.
P (03)
R25
U (06)
SYSTEM LOGIC 4 OF 16
LOCATION 7
MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.
TITLE
LOGIC DIAGRAM, COLUMN DRIVER;
POS. 7 (COLUMNS 1 THRU 4)
DATE 11/11/71
REV.
DRAWING NO
034040600
D 034040600 REV

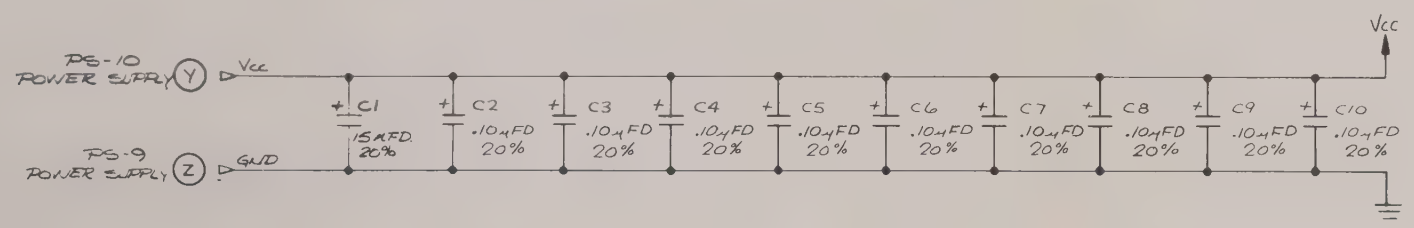
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REVISED & REDRAWN - ECA 1706		
	C	ADDED CAP C2 THRU C10 - ECA 2196		











SYSTEM LOGIC 5 OF 16

LOCATION 6

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE: LOGIC DIAGRAM, COLUMN DRIVER, POS; 6 (COLUMNS 5 THRU 8)

DATE	REV.	DRAWING NO
11/11/71	C	034040700

DO NOT SCALE PRINT

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

(01-22) X (H) GPR4

J2-35 20 D.L.1

J2-29 21 D.L.2

J2-23 19 D.L.4

J2-16 22 D.L.8

J2-10 7 COL. IN H.

(04-U) W (H) Z.S.

COLUMN 5

COLUMN 6

J2-74 13 D.L.1

J2-66 14 D.L.2

J2-59 12 D.L.4

J2-53 15 D.L.8

J2-47 K COL. IN H.

(05-C) C (H) DEST

(05-D) D L DCLR

S1 PROGRAMMABLE ZERO SUPPRESSION SWITCH

S2 PROGRAMMABLE ZERO SUPPRESSION SWITCH

(05-E) E (L) CC1X

(05-F) F (H) CC1X

(05-H) H (L) CC2X

(05-J) J (H) CC2X

(05-K) K (L) CC4X

(05-L) L (H) CC4X

(05-M) M (L) CC8X

(05-N) N (H) CC8X

(H) GPR4 A (07)

ACTR. COL 5 T J550-E MECHANISM

40 V. GND. U PS-8 POWER SUPPLY

P (07)

· COLUMN 5

· COLUMN 6

ACTR. COL. 6 V J550-K MECHANISM

40 V. GND. P (07)

(H) Z.S. B (07)

SYSTEM LOGIC 6 OF 16

DO NOT SCALE PRINT

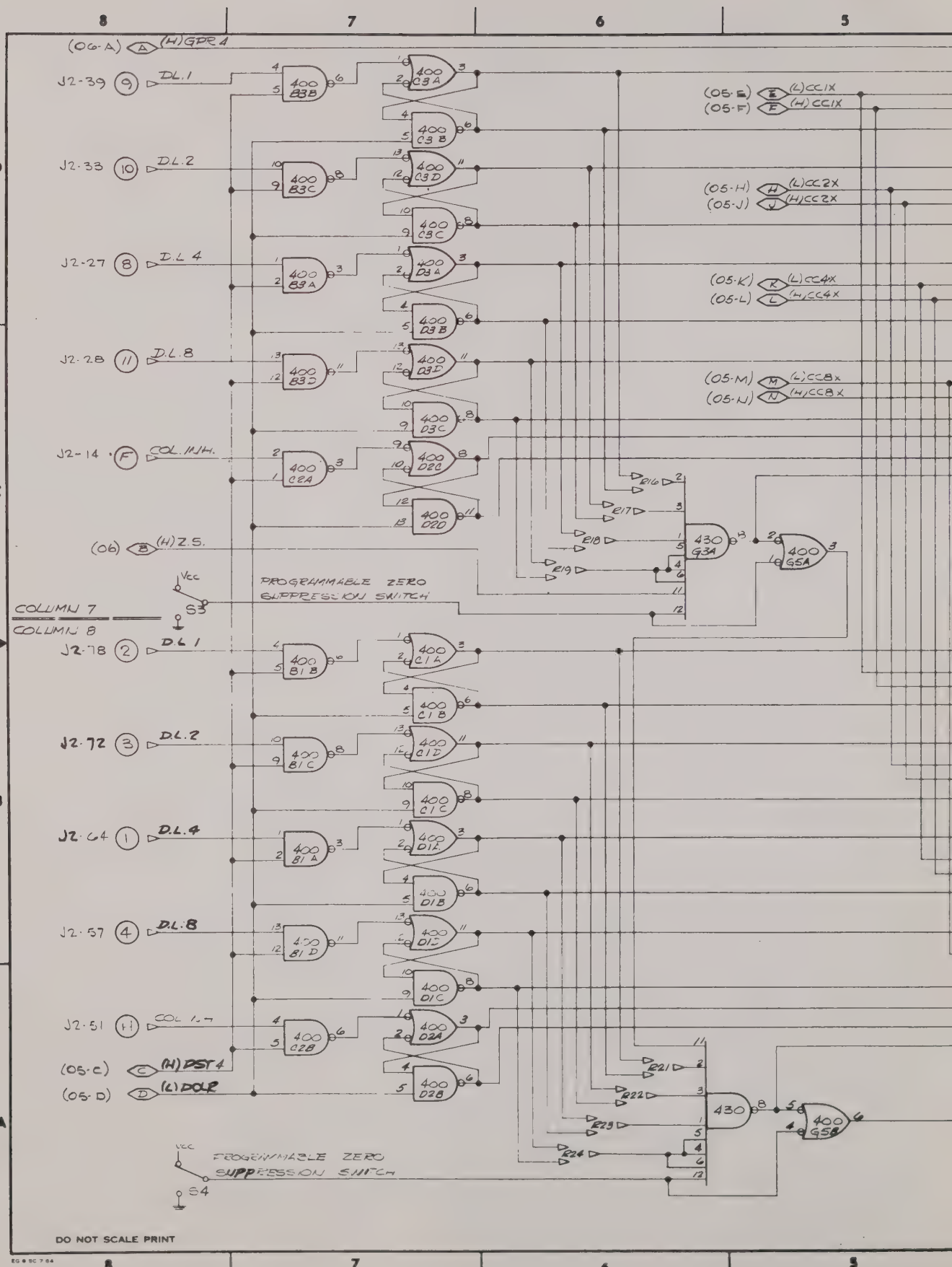
LOCATION 6

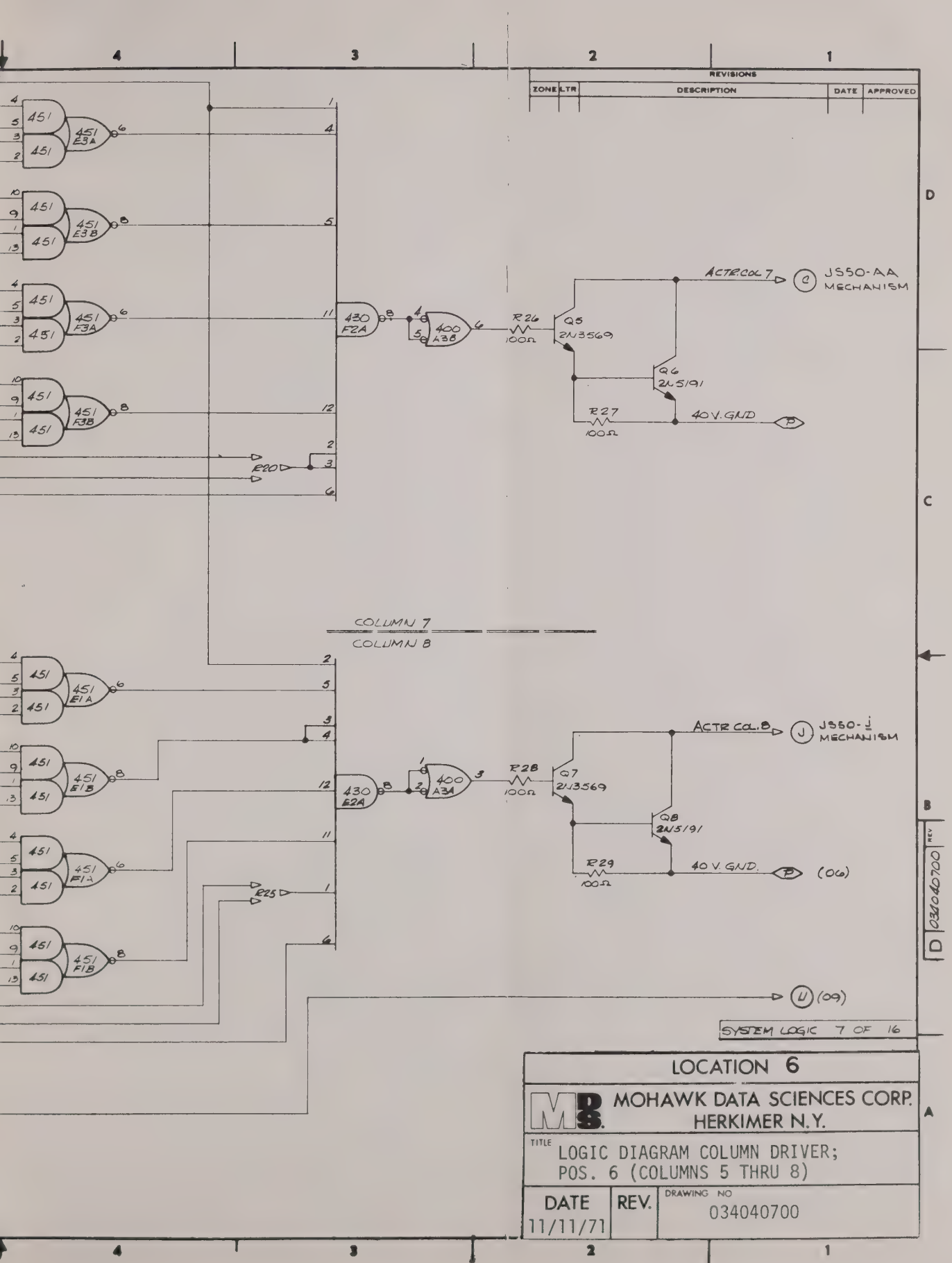
MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE: LOGIC DIAGRAM, COLUMN DRIVER POS. 6 (COLUMNS 5 THRU 8)

DATE	REV.	DRAWING NO
11/11/71		034040700

D 034040700 REV


8
7
6
5
D
C
B
A
(06-A) A (H)GDR A
J2-39 (9) DL.1
J2-33 (10) D.L.2
J2-27 (8) D.L 4
J2-28 (11) D.L.8
J2-14 (F) COL. 11/H.
(06) B (H) Z.5.
COLUMN 7
COLUMN 8
J2-78 (2) D.L 1
J2-72 (3) D.L.2
J2-64 (1) D.L.4
J2-57 (4) D.L.8
J2-51 (H) COL 1-7
(05-C) C (H) DST 4
(05-D) D (L) DOLR
(05-E) E (L) CC1X
(05-F) F (H) CC1X
(05-H) H (L) CC2X
(05-J) J (H) CC2X
(05-K) K (L) CC4X
(05-L) L (H) CC4X
(05-M) M (L) CC8X
(05-N) N (H) CC8X
PROGRAMMABLE ZERO SUPPRESSION SWITCH
S3
PROGRAMMABLE ZERO SUPPRESSION SWITCH
S4
Vcc
400 B3B
400 C3A
400 C3B
400 B3C
400 C3D
400 C3C
400 B3A
400 D3A
400 D3B
400 B3D
400 D3D
400 D3C
400 C2A
400 D2C
400 D2D
430 G3A
400 G5A
400 B1B
400 C1A
400 C1B
400 B1C
400 C1D
400 C1C
400 B1A
400 D1A
400 D1B
400 B1D
400 D1D
400 D1C
400 C2B
400 D2A
400 D2B
430
400 G5B
DO NOT SCALE PRINT


REVISIONS
ZONE LTR DESCRIPTION DATE APPROVED
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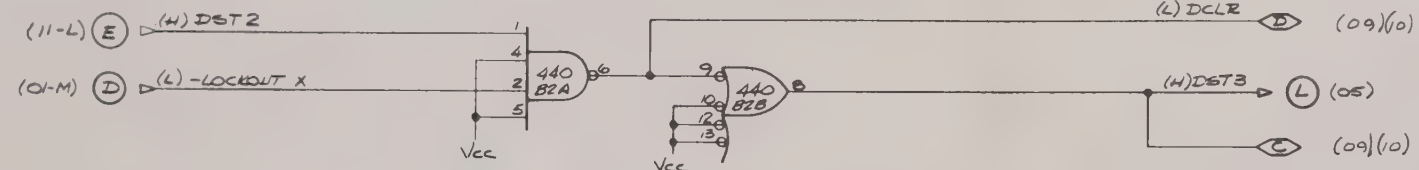
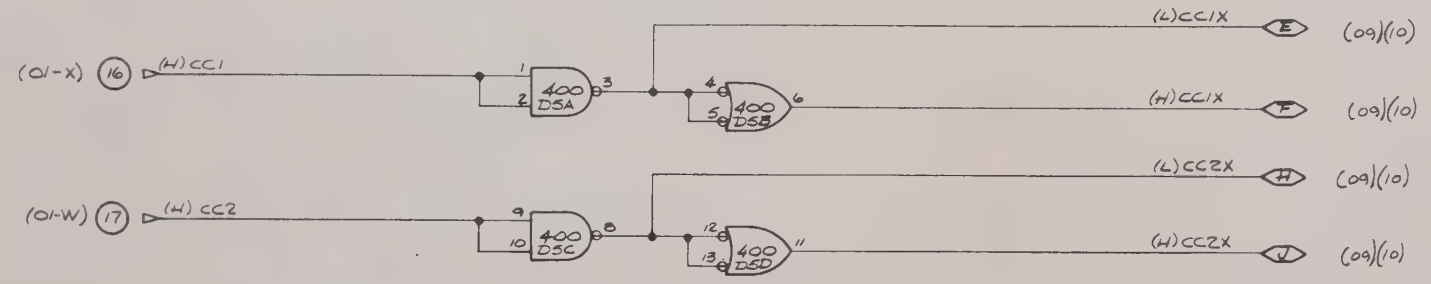
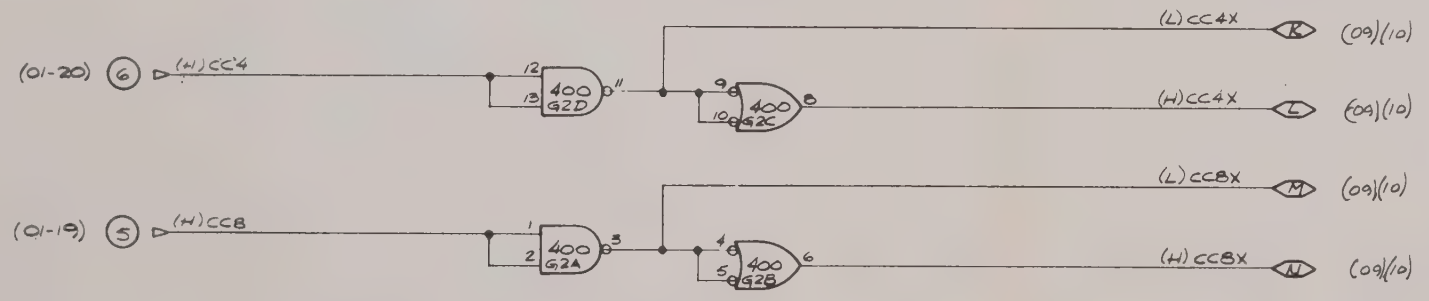
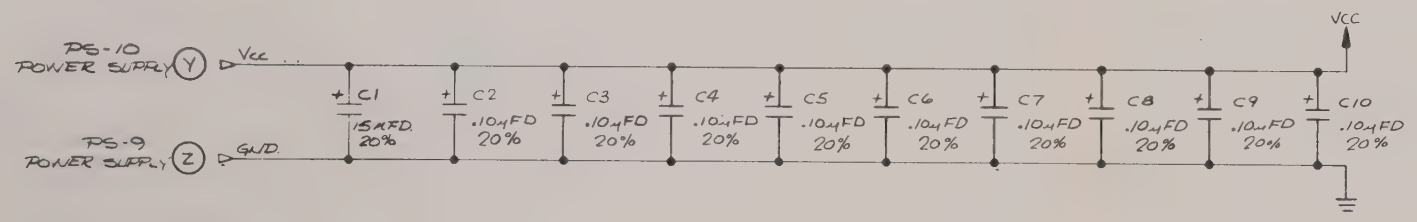
451 E3B
451 F3A
451 F3B
451 E1A
451 E1B
451 F1A
451 F1B
430 F2A
430 E2A
400 A3B
400 A3A
R26 100Ω
R27 100Ω
R28 100Ω
R29 100Ω
Q5 2N3569
Q6 2N5191
Q7 2N3569
Q8 2N5191
ACTR COL 7
JS50-AA MECHANISM
40 V. GND
ACTR COL 8
JS50-J MECHANISM
COLUMN 7
COLUMN 8
E20
E25
(06)
(09)
SYSTEM LOGIC 7 OF 16
LOCATION 6
MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.
TITLE
LOGIC DIAGRAM COLUMN DRIVER;
POS. 6 (COLUMNS 5 THRU 8)
DATE
11/11/71
REV.
DRAWING NO
034040700
D 034040700 REV.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REVISED & REDRAWN-ECA 1706	6/24/71	
	C	ADDED CAP. C2 THRU C10-ECA 2176	12-8-71	









SYSTEM LOGIC 8 OF 16

LOCATION 5

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE: LOGIC DIAGRAM, COLUMN DRIVER, POS. 5 (COLUMNS 9 THRU 12)

DATE	REV.	DRAWING NO
11/11/71	C	034040800

D 034040800 SH

DO NOT SCALE PRINT

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

(C-17) (X) M.CZR 3

J2 36 (20) D.L.1 — 400 B6B, 400 C6A

J2-30 (21) D.L.2 — 400 B6C, 400 C6D, 400 C6C

J2-24 (19) D.L.4 — 400 B6A, 400 D6A, 400 D6B

J2-17 (22) D.L.8 — 400 B6D, 400 D6D, 400 D6C

J2-11 (7) COL. INH. — 400 C2C, 400 C5C, 400 C5D

(07-L) (W) (H) Z.S.

5.6K 10% R1 — Vcc

PROGRAMMABLE ZERO SUPPRESSION SWITCH

S1

COLUMN 9
COLUMN 10

J2-75 (13) D.L.1 — 400 B4B, 400 C4A, 400 C4B

J2-67 (14) D.L.2 — 400 B4C, 400 C4D, 400 C4C

J2-60 (12) D.L.4 — 400 B4A, 400 D4A, 400 D4B

J2-54 (15) D.L.8 — 400 B4D, 400 C4D, 400 D4C

J2-48 (K) COL. INH. — 400 C2D, 400 C5A, 400 C5B

(08-C) (C) (H) DLT3

(08-D) (D) (L) DCLR

R2, R3, R4, R5 — 430 G6A, 400 G8C

R7, R8, R9, R10 — 430 G4A, 400 G5C

PROGRAMMABLE ZERO SUPPRESSION SWITCH

S2

(08-E) (E) (L) CC1X
(08-F) (F) (H) CC1X

(08-H) (H) (L) CC2X
(08-J) (J) (H) CC2X

(08-K) (K) (L) CC4X
(08-L) (L) (H) CC4X

(08-M) (M) (L) CC8X
(08-N) (N) (H) CC8X

451 E6A, 451 E6B, 451 F6A, 451 F6B

R6, R11

430 E5A, 400 A3D, R12 100Ω, Q1 2N3569, Q2 2N5191, R13 100Ω

ACTR COL. 9 (T) J550-8B MECHANISM

(H) GPR3 (A) (10)

40 V. GND. (H) P5-8 POWER SUPPLY

(P) (10)

COLUMN 9
COLUMN 10

451 E4A, 451 E4B, 451 F4A, 451 F4B

R11

430 F5A, 400 A3C, R14 100Ω, Q3 2N3569, Q4 2N5191, R15 100Ω

ACTR COL. 10 (V) J550-8 MECHANISM

40 V. GND. (P) (10)

(H) Z.S. (B) (10)

SYSTEM LOGIC 9 OF 16

DO NOT SCALE PRINT

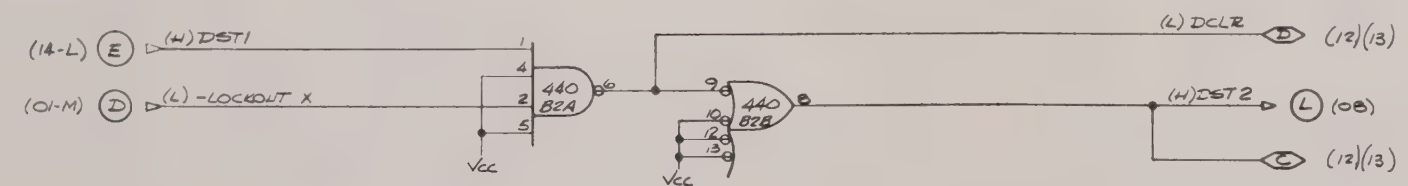
LOCATION 5

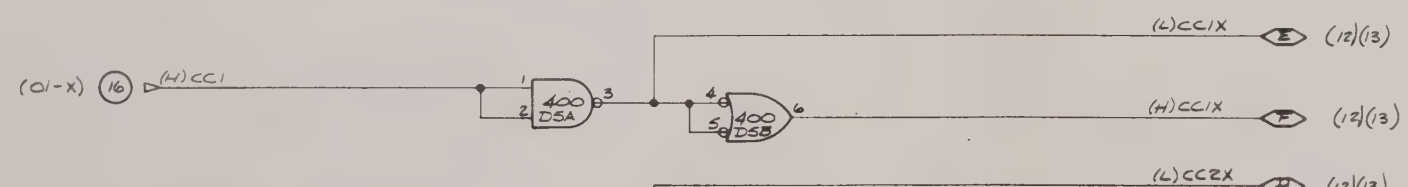
MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

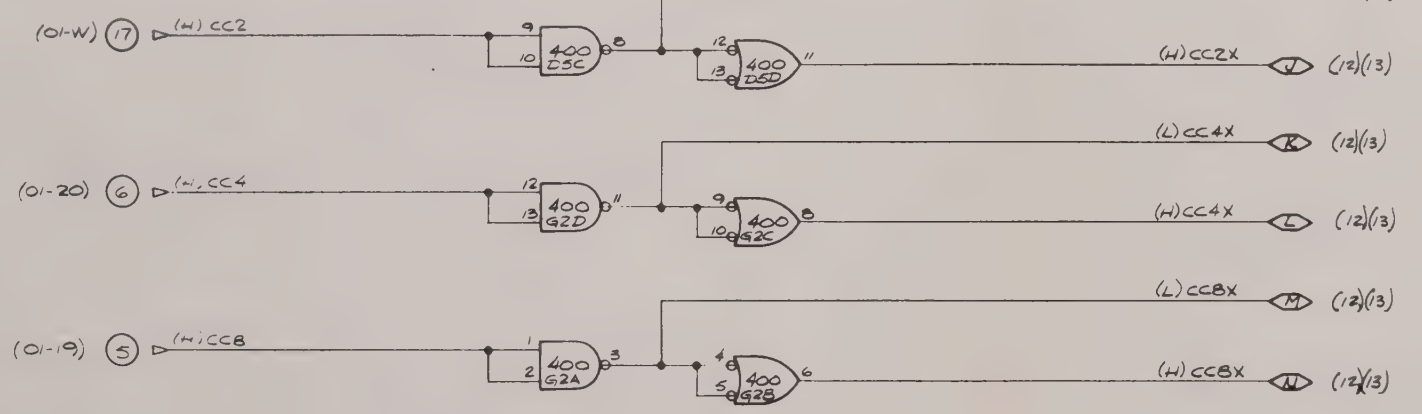
TITLE: LOGIC DIAGRAM, COLUMN DRIVER
POS. 5 (COLUMNS 9 THRU 12)

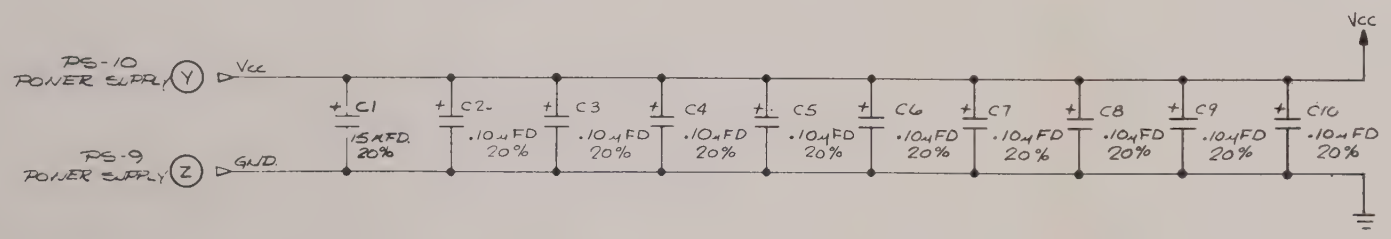
DATE	REV.	DRAWING NO
11/11/71		034040800

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REVISED & REDRAWN-ECA 1706	9-9-70	
	C	ADDED CAPS. C2 THRU C10-ECA 2176	12-3-70	12-8-70









SYSTEM LOGIC 11 OF 16

LOCATION 4

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE LOGIC DIAGRAM COLUMN DRIVER, POS. 4 (COLUMNS 13 THRU 16)

DATE	REV.	DRAWING NO
11/11/71	C	034040900

D 034040900 C

DO NOT SCALE PRINT

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE	APPROVED

(01-18) X (H) CPR 2

J1-34 20 D.L.1 — 400 B6B, C6A, C6B

J1-28 21 D.L.2 — 400 B6C, C6C, C6D

J1-22 19 D.L.4 — 400 B6A, D6A, D6B

J1-15 22 D.L.8 — 400 B6D, D6C, D6D

J1-8 7 COL. INH. — 400 C2C, C5C, C5D

(10-L) W (H) Z.S. — 5.6K 10% R1 to Vcc

PROGRAMMABLE ZERO SUPPRESSION SWITCH — Vcc, S1

COLUMN 13 / COLUMN 14

J1-73 13 D.L.1 — 400 B4B, C4A, C4B

J1-65 14 D.L.2 — 400 B4C, C4C, C4D

J1-58 12 D.L.4 — 400 B4A, D4A, D4B

J1-52 15 D.L.8 — 400 B4D, C4D, D4C

J1-46 K COL. INH. — 400 C2D, C5A, C5B

(11-C) C (H) DET 2

(11-D) D (L) I.C.L.R

PROGRAMMABLE ZERO SUPPRESSION SWITCH — Vcc, S2

400 G5, 430, R8, R9, R10

400 G5A, 430 G4A, R7, R8, R9, R10

(11-E) E (L) CC1X / (11-F) F (H) CC1X — 451 E6A

(11-H) H (L) CC2X / (11-J) J (H) CC2X — 451 E6B

(11-K) K (L) CC4X / (11-K) L (H) CC4X — 451 F6A

(11-M) M (L) CC8X / (11-N) N (H) CC8X — 451 F6B

451 E4A, 451 E4B, 451 F4A, 451 F4B

COLUMN 13 / COLUMN 14

430 E5A, 400 A3D, R12 100Ω, Q1 2N3569, Q2 2N5191, R13 100Ω

ACTR. COL 13 → (T) J550-DD MECHANISM

40 V. GND → (H) P.S.-B POWER SUPPLY

(H) GPR2 (A) (13)

(P) (13)

430 F5A, 400 A3C, R14 100Ω, Q3 2N3569, Q4 2N5191, R15 100Ω, R11

ACTR. COL 14 → (V) J550-e MECHANISM

40 V. GND. (P) (13)

(H) Z.S. (5) (13)

SYSTEM LOGIC 12 OF 16

DO NOT SCALE PRINT

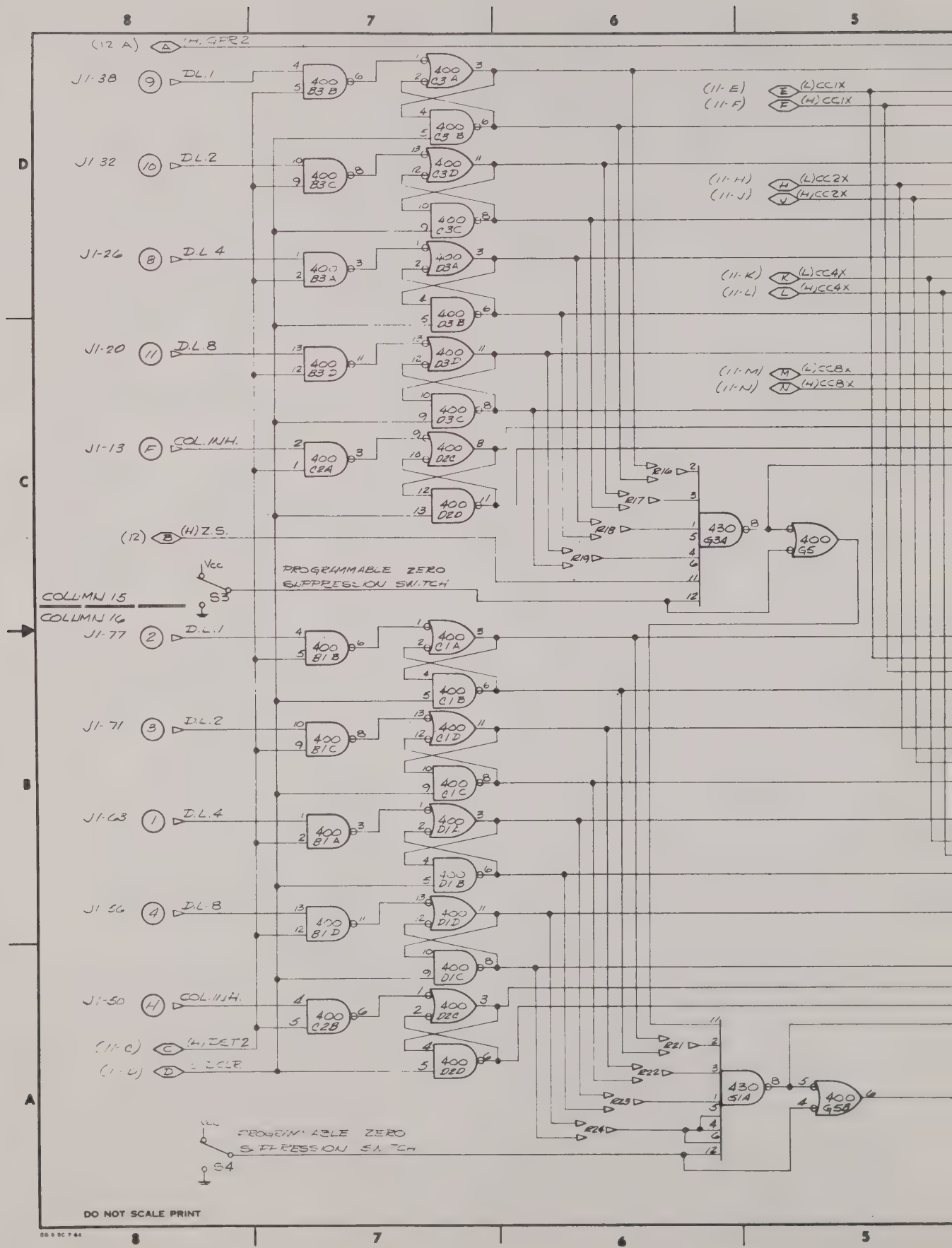
LOCATION 4

MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.

TITLE: LOGIC DIAGRAM, COLUMN DRIVER, POS. 4 (COLUMNS 13 THRU 16)

DATE	REV.	DRAWING NO
11/11/71		034040900

D 034040900


8
7
6
5
D
C
B
A
(12 A) A 'H. SPR 2
J1-38 9 DL.1
J1 32 10 DL.2
J1-26 8 D.L 4
J1-20 11 D.L.8
J1-13 F COL. IN H.
(12) B (H) Z.S.
Vcc
PROGRAMMABLE ZERO SUPPRESSION SWITCH
S3
COLUMN 15
COLUMN 16
J1-77 2 D.L.1
J1-71 3 D.L.2
J1-63 1 D.L.4
J1 56 4 D.L.8
J1-50 H COL. IN H.
(11-C) C (H) DET 2
(1-L) D CCLR
PROGRAMMABLE ZERO SUPPRESSION SWITCH
S4
(11-E) E (L) CC1X
(11-F) F (H) CC1X
(11-H) H (L) CC2X
(11-J) V (H) CC2X
(11-K) K (L) CC4X
(11-L) L (H) CC4X
(11-M) M (L) CC8X
(11-N) N (H) CC8X
400 B3 B
400 C3 A
400 C3 B
400 B3 C
400 C3 D
400 C3 C
400 B3 A
400 D3 A
400 D3 B
400 B3 D
400 D3 D
400 D3 C
400 C2 A
400 D2 C
400 D2 D
R16
R17
R18
R19
430 G3A
400 G5
400 B1 B
400 C1 A
400 C1 B
400 B1 C
400 C1 D
400 C1 C
400 B1 A
400 D1 A
400 D1 B
400 B1 D
400 D1 D
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R22
R23
R24
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400 G5B
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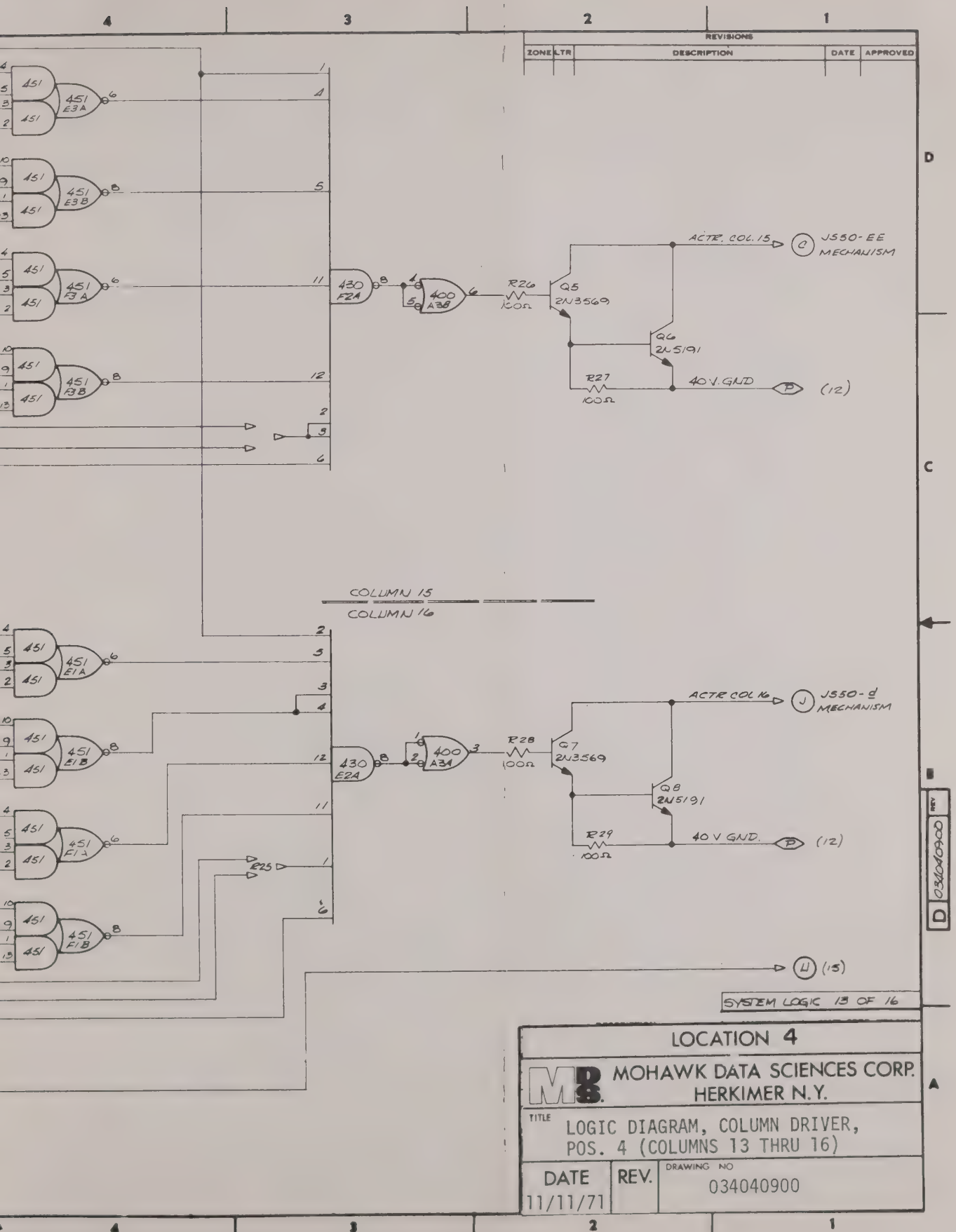
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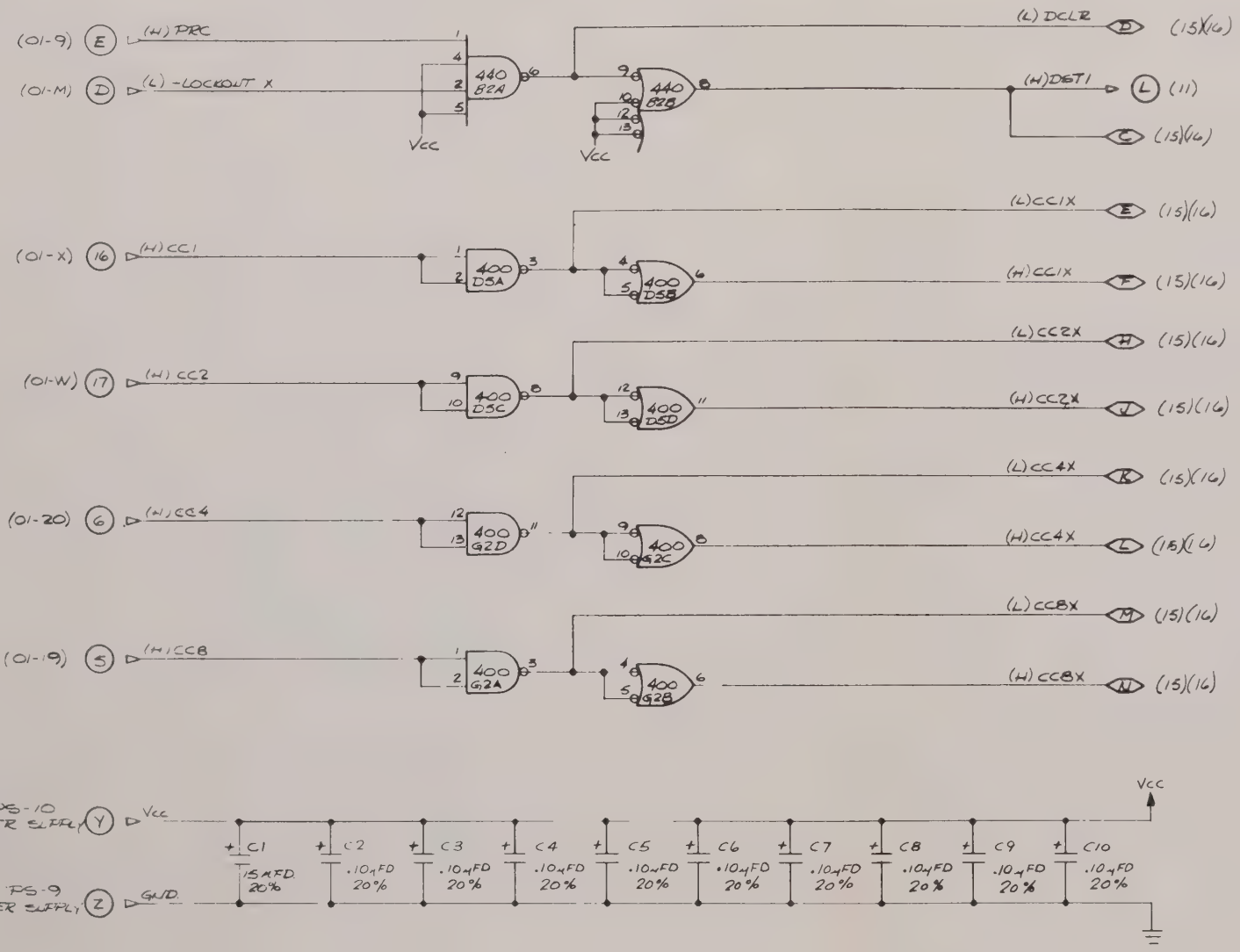
451 F3A
451 F3B
430 F2A
400 A38
R26 100Ω
Q5 2N3569
Q6 2N5191
R27 100Ω
ACTR. COL. 15
J550-EE MECHANISM
40 V. GND
(12)
COLUMN 15
COLUMN 16
451 E1A
451 E1B
451 F1A
451 F1B
430 E2A
400 A34
R28 100Ω
Q7 2N3569
Q8 2N5191
R29 100Ω
ACTR COL 16
J550-d MECHANISM
40 V GND.
(12)
E25
(15)
SYSTEM LOGIC 13 OF 16
LOCATION 4
MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.
TITLE
LOGIC DIAGRAM, COLUMN DRIVER, POS. 4 (COLUMNS 13 THRU 16)
DATE 11/11/71
REV.
DRAWING NO 034040900
D 034040900 REV

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REVISED & REDRAWN PER CA [illegible]	[illegible]	[illegible]
	C	ADDED CAPS, C2 THRU C10 - ECA [illegible]	[illegible]	[illegible]



SYSTEM LOGIC 14 OF 16

DO NOT SCALE PRINT

LOCATION 3

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE LOGIC DIAGRAM, COLUMN DRIVER, POS. 3 (COLUMNS 17 THRU 20)

DATE	REV.	DRAWING NO
11/11/71	C	034041000

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

(01-5) X — M.CTR1

J1-35 (20) — DL 1 — 400 B6B, C6A

J1-29 (21) — DL 2 — 400 B6C, C6D, C6C

J1-23 (19) — DL 4 — 400 B6A, D6A, D6B

J1-16 (22) — DL 8 — 400 B6D, D6D, D6C

J1-10 (7) — COL INH. — 400 C2C, C5C, C5D

(13-U) W — (H) Z S.

5.6K 10% R1 — Vcc — PROGRAMMABLE ZERO SUPPRESSION SWITCH — S1

COLUMN 17 / COLUMN 18

J1-74 (13) — DL 1 — 400 B4B, C4A, C4B

J1-66 (14) — DL 2 — 400 B4C, C4D, C4C

J1-59 (12) — DL 4 — 400 B4A, D4A, D4B

J1-53 (15) — DL 8 — 400 B4D, D4D, D4C

J1-47 (K) — COL INH — 400 C2D, C5A, C5B

(14-C) C — HI DET I

(14-D) D — L SCLR.

PROGRAMMABLE ZERO SUPPRESSION SW. 2 — S2

(14-E) E — (L) CC1X
(14-F) F — (H) CC1X

(14-H) H — (L) CC2X
(14-J) J — (H) CC2X

(14-K) K — (L) CC4X
(14-L) L — (H) CC4X

(14-M) M — (L) CC8X
(14-N) N — (H) CC8X

R2, R3, R4, R5 — 430 G6A — 400 G6C

451 E6A, E6B, F6A, F6B

R6, R11 — 430 E5A, F5A — 400 A2D, A3C

R12 100Ω — Q1 2N3569 — ACTR. COL 17 — (T) J350-FF MECHANISM

R13 100Ω — Q2 2N5191 — 40 V. GND — (N) P.S. - 8 POWER SUPPLY — (P) (16)

R14 100Ω — Q3 2N3569 — ACTR. COL 18 — (V) J350-9 MECHANISM

R15 100Ω — Q4 2N5191 — 40 V. GND. — (R) (16)

(H) GPR1 — (A) (16)

(H) Z.S. — (B) (16)

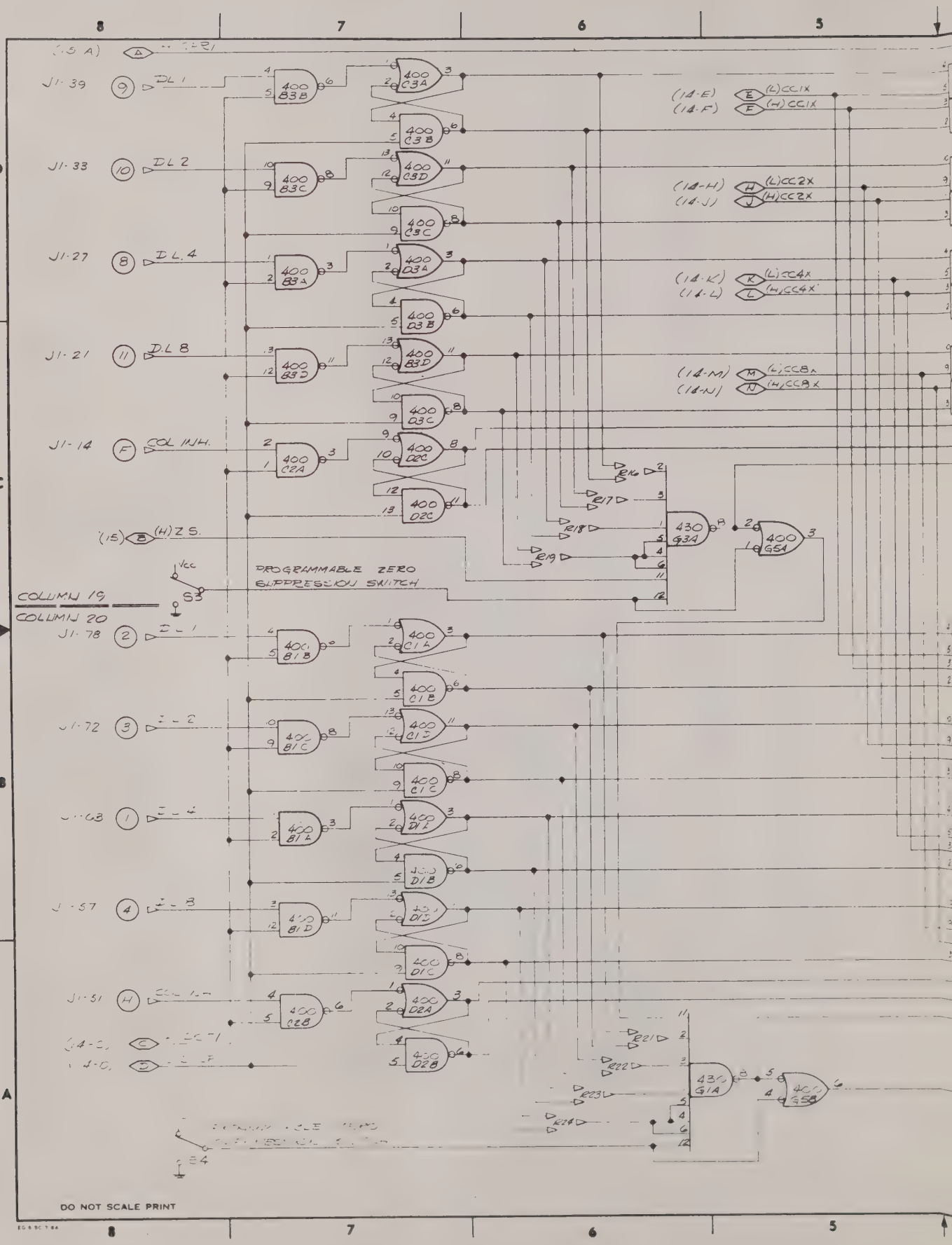
430 G4A — 400 G5D

SYSTEM LOGIC 15 OF 16

DO NOT SCALE PRINT

LOCATION 3		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: LOGIC DIAGRAM, COLUMN DRIVER, POS. 3 (COLUMNS 17 THRU 20)		
DATE: 11/11/71	REV.	DRAWING NO: 034041000

D 034041000


8
7
6
5
D
C
B
A
J1-39
9
DL 1
J1-33
10
DL 2
J1-27
8
DL 4
J1-21
11
DL 8
J1-14
F
COL INH.
(15)
B
(H) Z S.
Vcc
S3
PROGRAMMABLE ZERO SUPPRESSION SWITCH
COLUMN 19
COLUMN 20
J1-78
2
J1-72
3
J1-63
1
J1-57
4
J1-51
H
(14-E)
E
(L) CC1X
(14-F)
F
(H) CC1X
(14-H)
H
(L) CC2X
(14-J)
J
(H) CC2X
(14-K)
K
(L) CC4X
(14-L)
L
(H) CC4X
(14-M)
M
(L) CC8X
(14-N)
N
(H) CC8X
400 B3B
400 C3A
400 C3B
400 B3C
400 C3D
400 C3C
400 B3A
400 D3A
400 D3B
400 B3D
400 D3C
400 C2A
400 D2C
E16
E17
E18
E19
430 G3A
400 G5A
400 B1B
400 C1A
400 C1B
400 B1C
400 C1D
400 C1C
400 B1A
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400 D1B
400 B1D
400 D1D
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E21
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400 G5B
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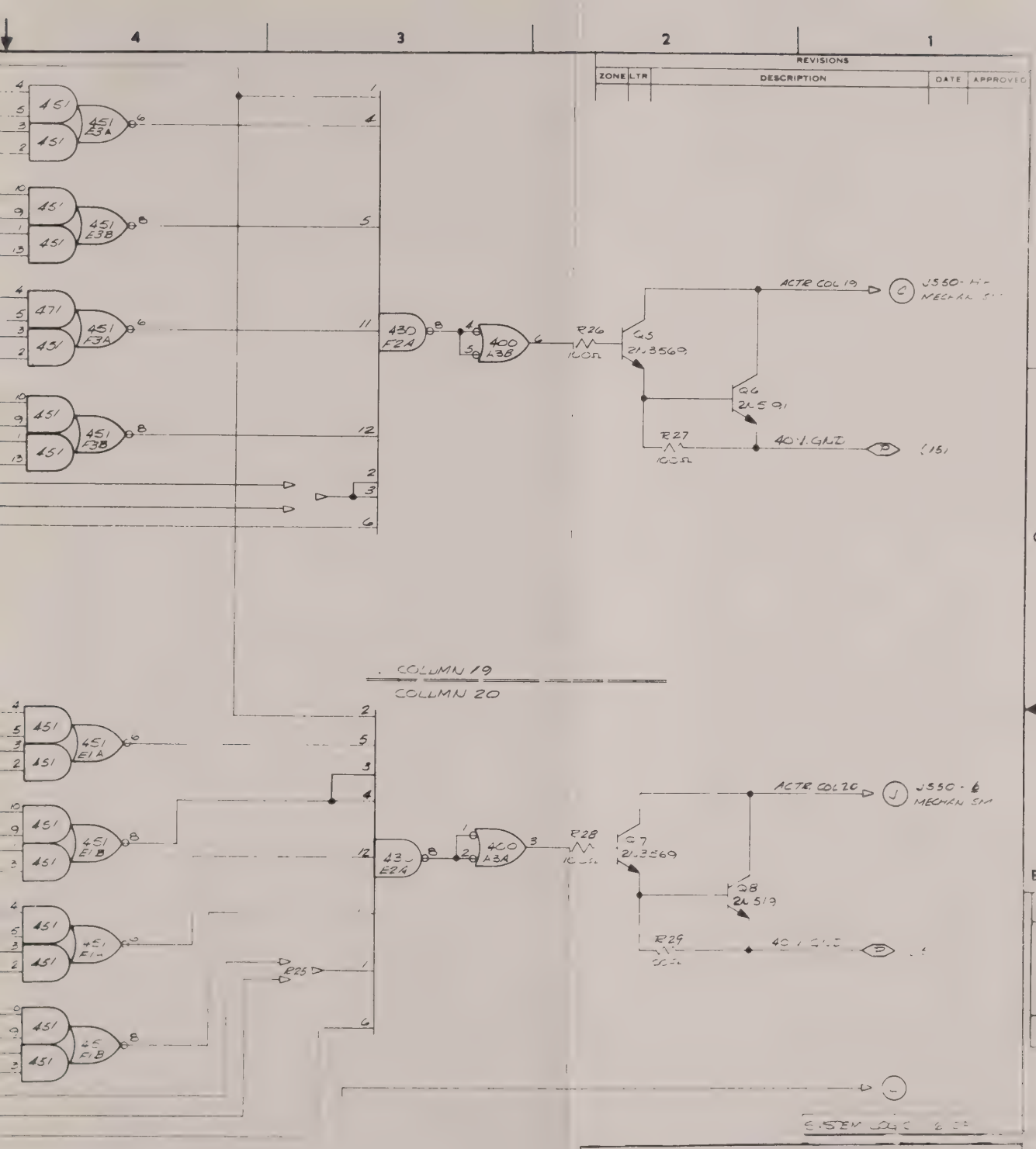
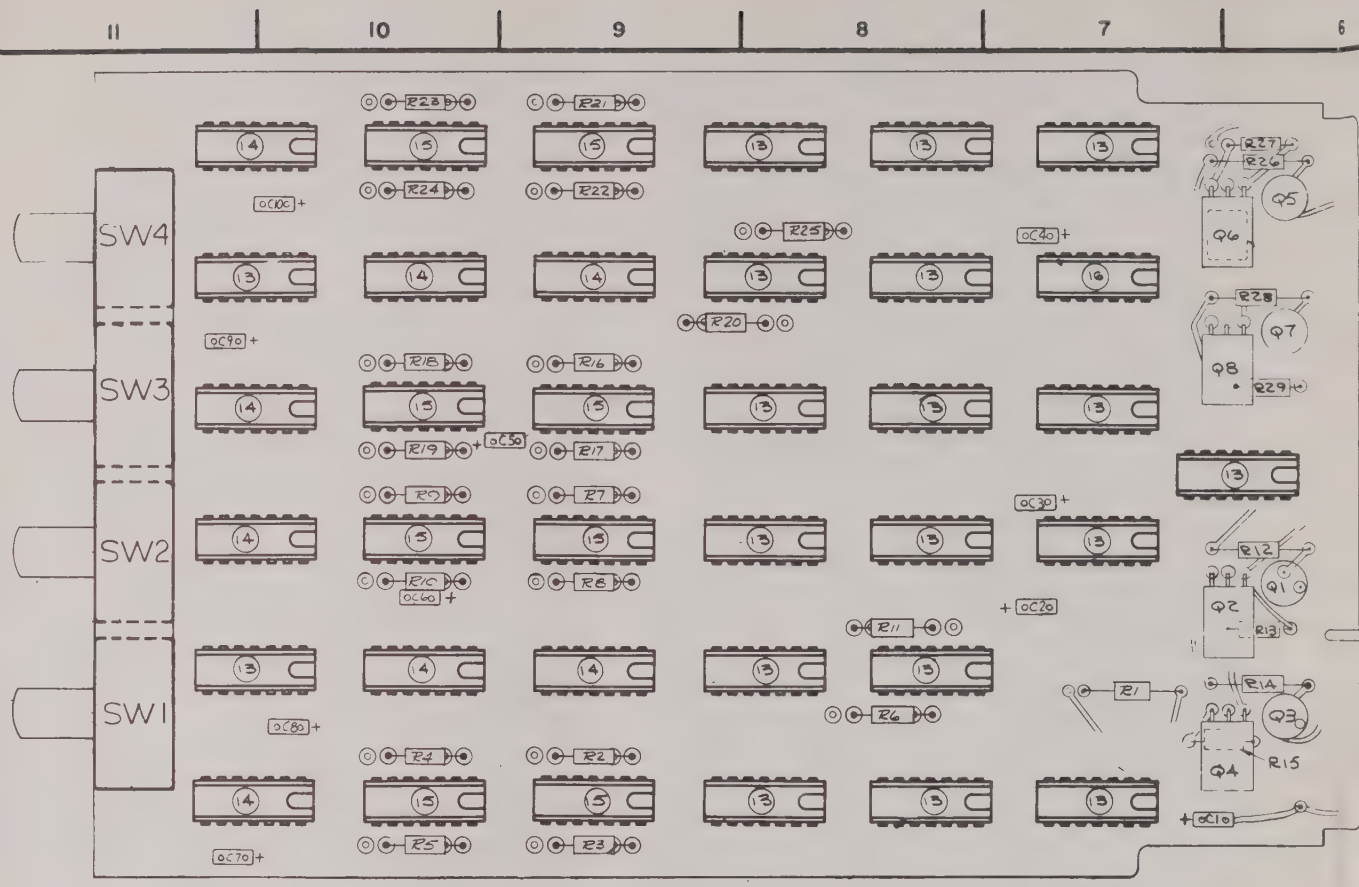


LOCATION 3

MOHAWK DATA SCIENCES CORP.
HERKIMER N.Y.

TITLE LOGIC DIAGRAM, COLUMN DRIVER, POS. 3 (COLUMNS 17 THRU 20)

DATE	REV.	DRAWING NO.
11/11/71		034041000



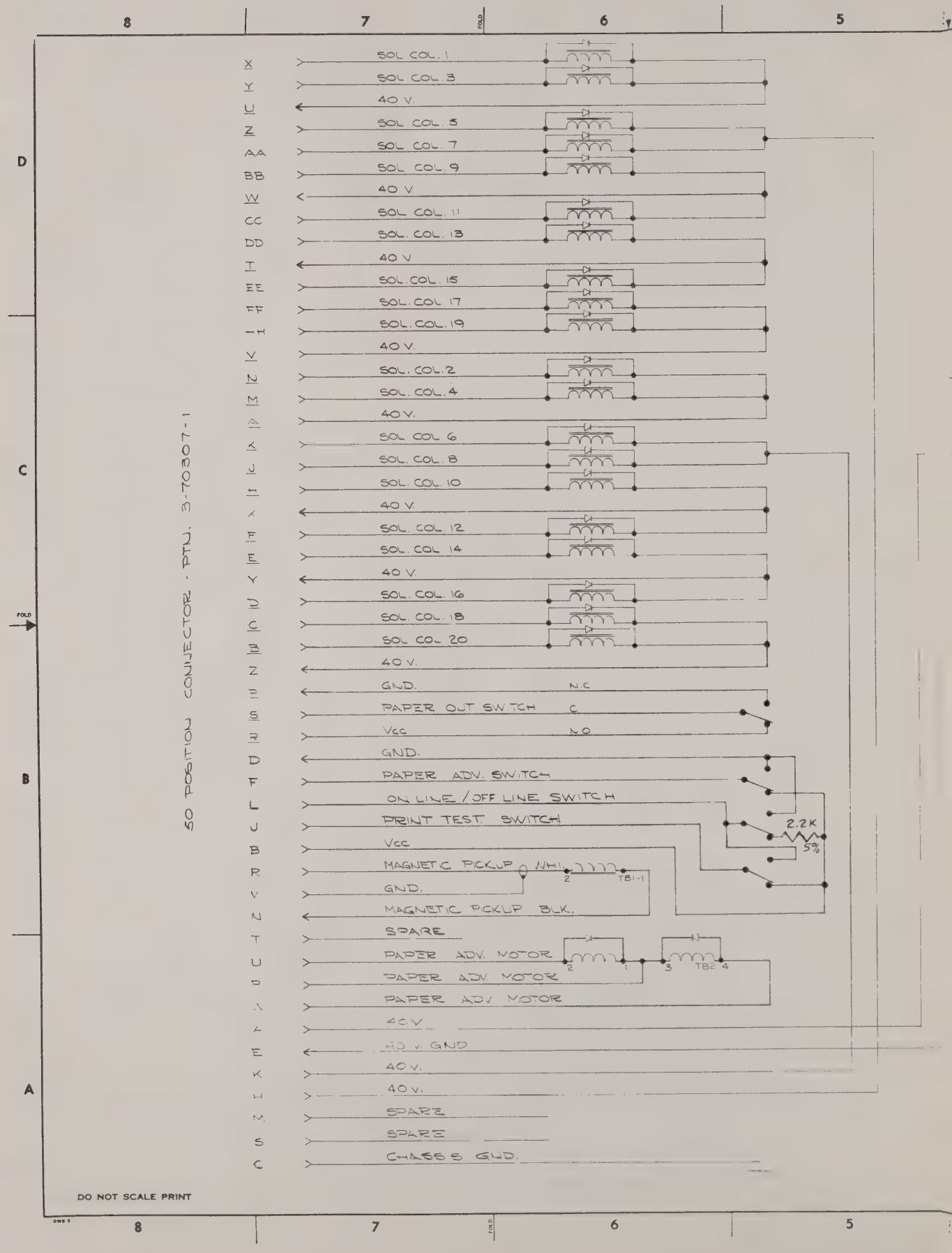
COMPONENT DESCRIPTION	PART NUMBER
RES. 2.7 OHM 1/4W, 10%	387000001
RES. 100 OHM 1/4W, 10%	387000020
RES. 5.6K 1/4W, 10%	387000041
TRANS. INSULATOR	438000101
TRANS. 2N3569	436000501
TRANS. 2N5191	436004901
CAP. 10uf, 20%	134007301
CAP. 15uf 20%	134007303
CIR. MODULE	261000501
CIR. MODULE	261000701
CIR. MODULE	261000401
CIR. MODULE	261000001
SWITCH	034042201

NOT USABLE		USABLE		MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.			
REVISION (S)	UPDATE WITH	REVISION (S)	P. C. N.#	TITLE COLUMN DRIVER BOARD ASSEMBLY			
				PART NUMBER	EQUIPMENT USED ON	MODULE LOCATION	REV.
				03404601	2016		G

NOTES:

1. In the parts list, components are listed by component type and in value order.

2. Component values can be obtained from the Logic Drawings and/or by physically looking at the printed circuit board assembly.


50 POSITION CONJECTOR - PTN. 3-70307-1
SOL COL. 1
SOL COL. 3
40 V.
SOL COL. 5
SOL COL. 7
SOL COL. 9
40 V.
SOL COL. 11
SOL COL. 13
40 V
SOL. COL. 15
SOL. COL 17
SOL. COL. 19
40 V.
SOL. COL. 2
SOL. COL. 4
40 V.
SOL COL 6
SOL. COL. 8
SOL. COL. 10
40 V.
SOL. COL. 12
SOL. COL 14
40 V.
SOL. COL. 16
SOL. COL. 18
SOL COL 20
40 V.
GND.
N.C
PAPER OUT SWITCH
C
Vcc
N.O
GND.
PAPER ADV. SWITCH
ON LINE / OFF LINE SWITCH
PRINT TEST SWITCH
2.2K
5%
Vcc
MAGNETIC PICKUP
WHT.
2
TB1-1
GND.
MAGNETIC PICKUP BLK.
SPARE
PAPER ADV. MOTOR
2
1
3
TB2
4
PAPER ADV. MOTOR
PAPER ADV. MOTOR
40 V
40 v. GND
40 v.
40 v.
SPARE
SPARE
CHASSIS GND.
DO NOT SCALE PRINT

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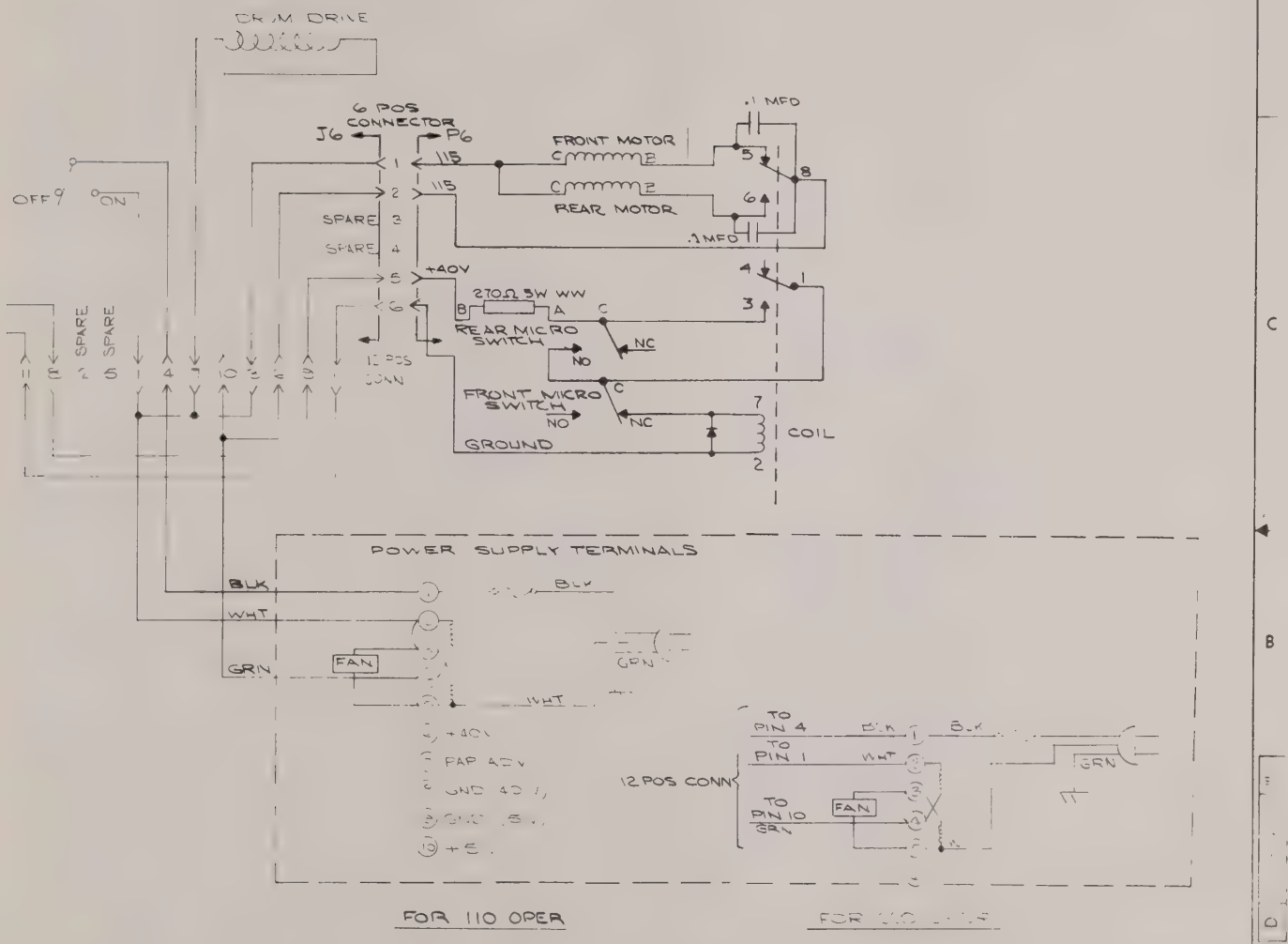
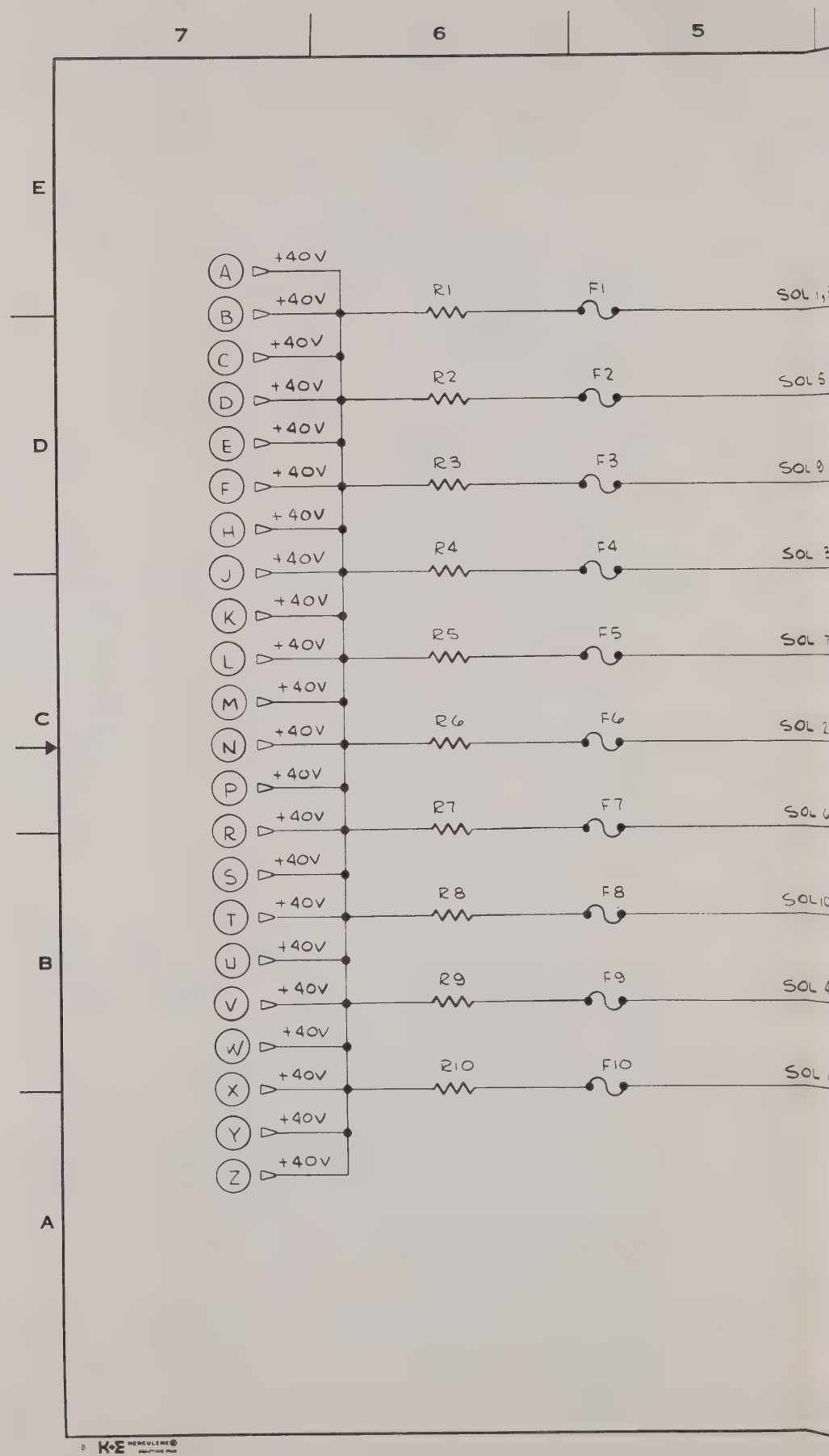
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
–	A	AS PER ECA# 1657	2 AUG 1969	
	B	AS PER ECA# 1712	2 JUL 1969	
	C	AS PER ECA# 1778	11 SEP 1969	
	D	AS PER ECA# 1955	29 JUL 1970	



LOCATION		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: SCHEMATIC, MECHANISM		
DATE: 11/11/71	REV.: D	DRAWING NO: 034035400


7
6
5
E
D
C
B
A
A +40V
B +40V
C +40V
D +40V
E +40V
F +40V
H +40V
J +40V
K +40V
L +40V
M +40V
N +40V
P +40V
R +40V
S +40V
T +40V
U +40V
V +40V
W +40V
X +40V
Y +40V
Z +40V
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
SOL 1,
SOL 5
SOL 9
SOL 3
SOL 7
SOL 2
SOL 6
SOL 10
SOL 4
SOL 8

NEXT ASS'Y.	FIRST USED ON
D0340429	2016,17,18,19

REVISIONS				
REV	ECA	DESCRIPTION	DATE	APPROVAL
A	2517 -2	RELEASE	7/12/71	C.S 8-9-71

L 1,3 → (2)

L 5,7 → (4)

L 9,11 → (6)

L 13,15 → (8)

L 17,19 → (10)

L 2,4 → (12)

L 6,8 → (14)

L 10,12 → (16)

L 14,16 → (18)

L 18,20 → (20)

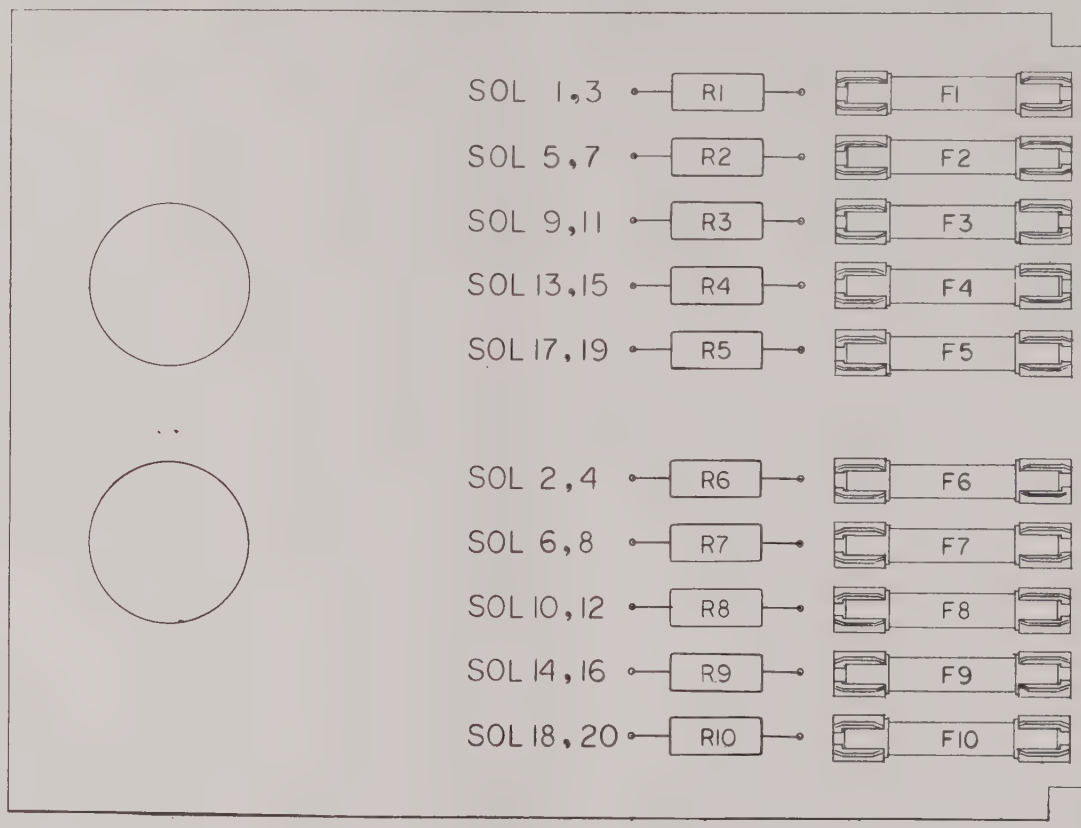
NOTE

1. UNLESS OTHERWISE SPECIFIED:
   RESISTORS ARE 3Ω, 3W, 5%.
   FUSES ARE 1/2 AMP, SLO-BLO.

EA 0342670

REF NO. 034267001

LOCATION		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: SCHEMATIC FUSE CARD		
DATE 11/11/71	REV. A	DRAWING NO 0342670



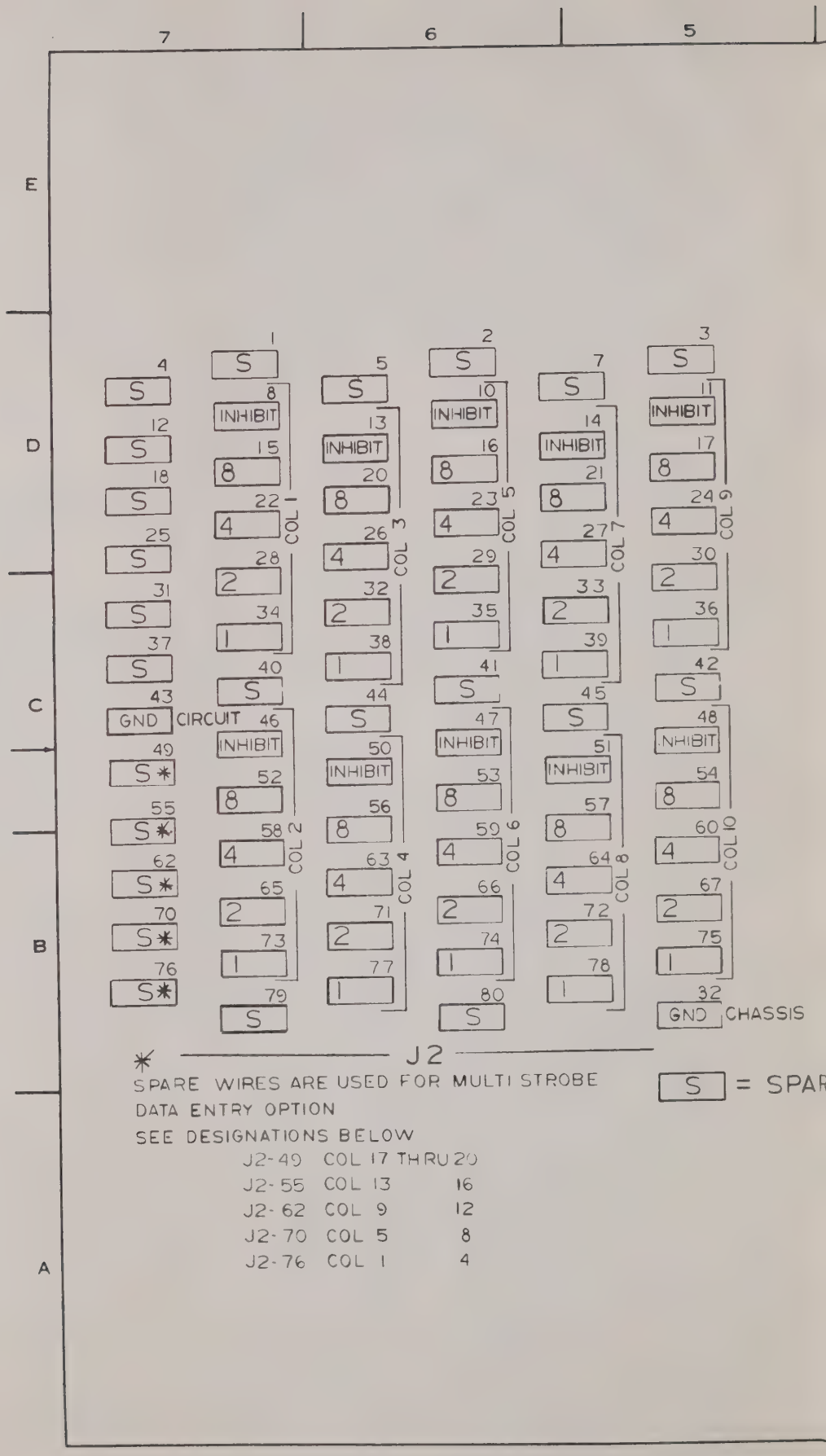
COMPONENT DESCRIPTION	PART NUMBER
RES. 30HM 3W, 5%	387001501
FUSE HOLDER	142000601
FUSE - SLO BLO TYPE	203132001

NOT USABLE		USABLE		MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.			
REVISION (S)	UPDATE WITH	REVISION (S)	P. C. N.#	TITLE FUSE CARD ASSY			
				PART NUMBER	EQUIPMENT USED ON	MODULE LOCATION	REV.
				034042901	2016 2018		E

NOTES:

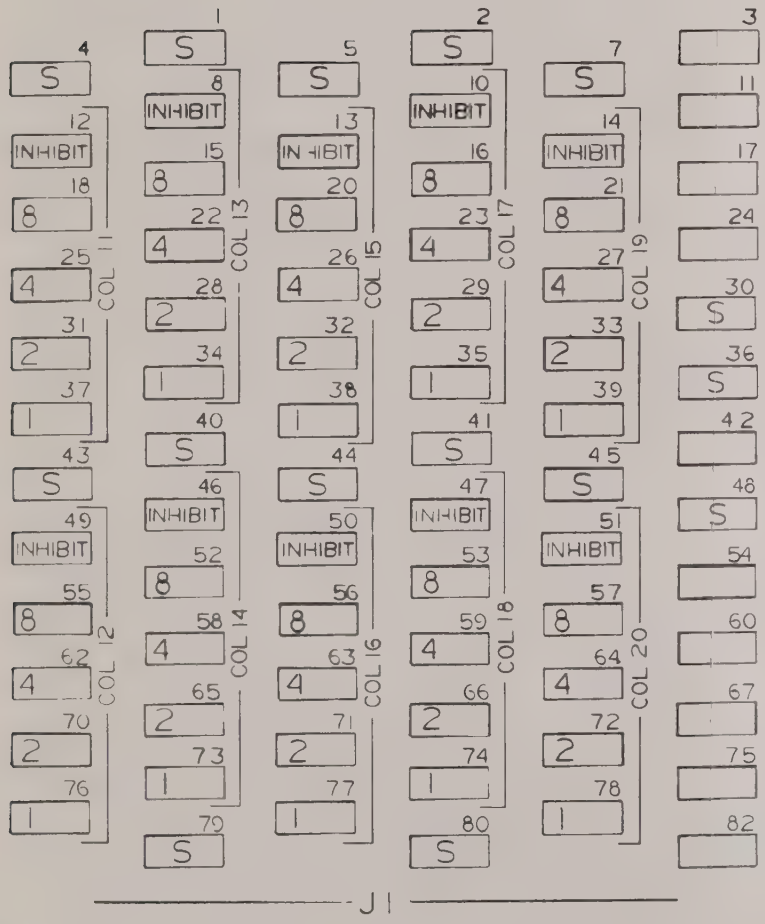
1. In the parts list, components are listed by component type and in value order.

2. Component values can be obtained from the Logic Drawings and/or by physically looking at the printed circuit board assembly.


7
6
5
E
D
C
B
A
4 S
12 S
18 S
25 S
31 S
37 S
43 GND CIRCUIT
49 S*
55 S*
62 S*
70 S*
76 S*
1 S
8 INHIBIT
15 8
22 4
28 2
34 1
40 S
COL 1
46 INHIBIT
52 8
58 4
65 2
73 1
79 S
COL 2
5 S
13 INHIBIT
20 8
26 4
32 2
38 1
44 S
50 INHIBIT
56 8
63 4
71 2
77 1
COL 3
COL 4
2 S
10 INHIBIT
16 8
23 4
29 2
35 1
41 S
47 INHIBIT
53 8
59 4
66 2
74 1
80 S
COL 5
COL 6
7 S
14 INHIBIT
21 8
27 4
33 2
39 1
45 S
51 INHIBIT
57 8
64 4
72 2
78 1
COL 7
COL 8
3 S
11 INHIBIT
17 8
24 4
30 2
36 1
42 S
48 INHIBIT
54 8
60 4
67 2
75 1
32 GND CHASSIS
COL 9
COL 10
* J2
SPARE WIRES ARE USED FOR MULTI STROBE DATA ENTRY OPTION
SEE DESIGNATIONS BELOW
J2-49 COL 17 THRU 20
J2-55 COL 13 16
J2-62 COL 9 12
J2-70 COL 5 8
J2-76 COL 1 4
S = SPAR

NEXT ASS'Y.	FIRST USED ON
MANUAL	2016

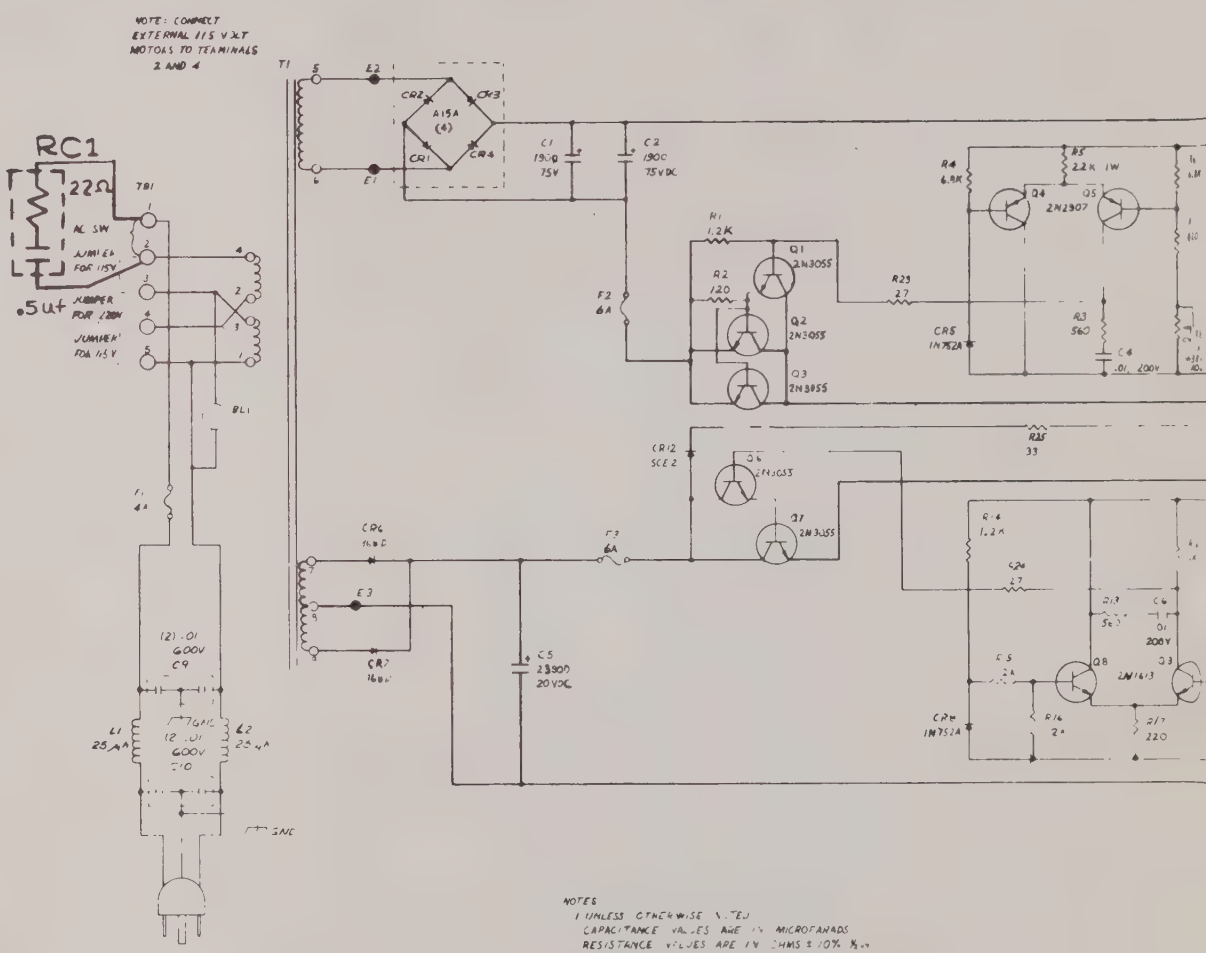
REVISIONS				
REV	ECA	DESCRIPTION	DATE	APPROVAL
A	1768	RELEASE ECA J Sweet	24SEP 1969	L.S 10-6-69



CO340799 A

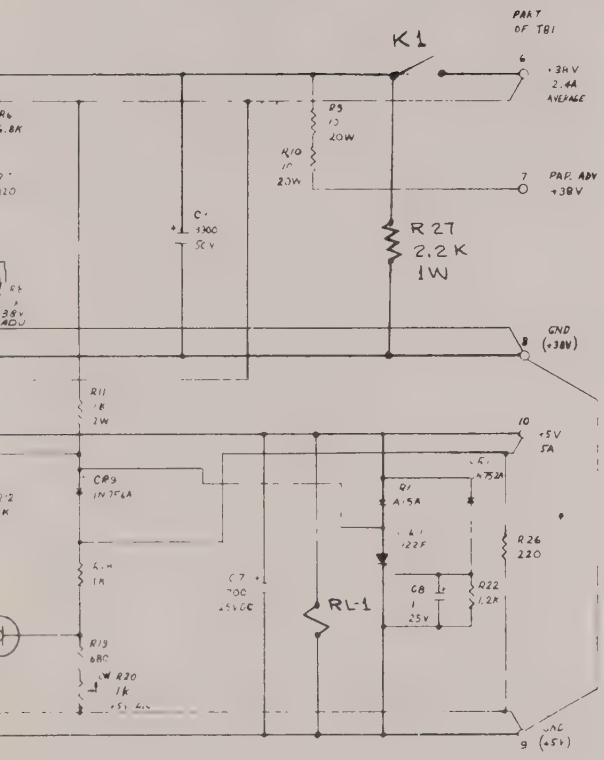
RE

LOCATION		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE CONNECTION CHART CUSTOMER INPUT		
DATE 11/11/71	REV. A	DRAWING NO. 034079900



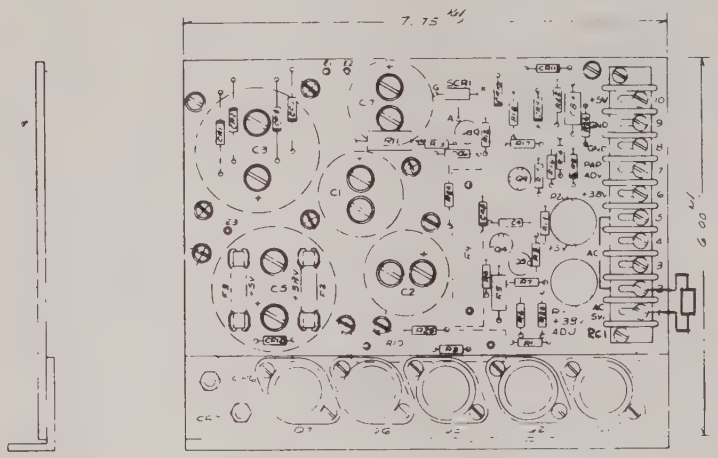
NOTES
1 UNLESS OTHERWISE NOTED
CAPACITANCE VALUES ARE IN MICROFARADS
RESISTANCE VALUES ARE IN OHMS ± 10% ½ W

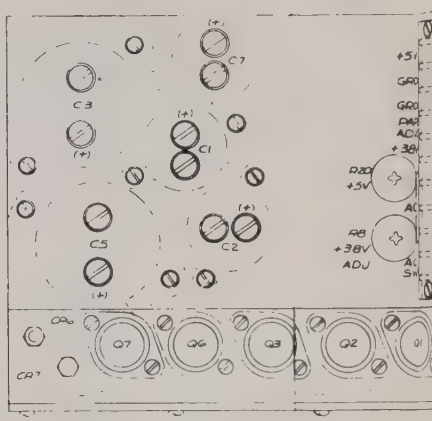
2. THIS SCHEMATIC FOR B03403680Z ONLY



SHT 1 of 3

LOCATION		
MDS MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: POWER SUPPLY		
DATE 11/17/71	REV. F	DRAWING NO 034036800





SPECIFICATIONS

1. MAX DIMENSIONS - 7.75 W 6.5 DP & 6.5 HIGH. FORCED AIR COOLING WITH AIR INTAKE LOCATED AT REAR OF UNIT AS SHOWN (ZONE B2,D6,) LINE CORD AND PRIMARY FUSE ALSO ON REAR SURFACE. TERMINAL STRIP & SECONDARY FUSES TO BE ON TOP AND ARE TO BE EASILY ACCESSIBLE.

2. PRIMARY REQUIREMENTS
SPLIT PRIMARY FOR 115V ±10V OR 230V ± 20V, 50 ± 1 CYCLE OR 60 ± .5 CYCLE OPERATION. TOTAL PRIMARY MUST HAVE A MIN POWER CAPABILITY OF 500 VA (IN 230V MODE 1/2 PRIMARY MUST SUPPLY A 1.5 AMPERE LOAD @ 115VAC.

3. OUTPUT REQUIREMENTS
(5 VOLT SUPPLY)
5.0VDC ± 5% TOTAL FOR LINE AND LOAD VARIATIONS
RIPPLE 50 MILLIVOLTS MAX PEAK TO PEAK
FULL LOAD 5.0 AMP — MIN LOAD 3.0 AMP
OVERVOLTAGE CROWBAR CIRCUIT SET TO TRIP BETWEEN 5.5V AND 6.2V

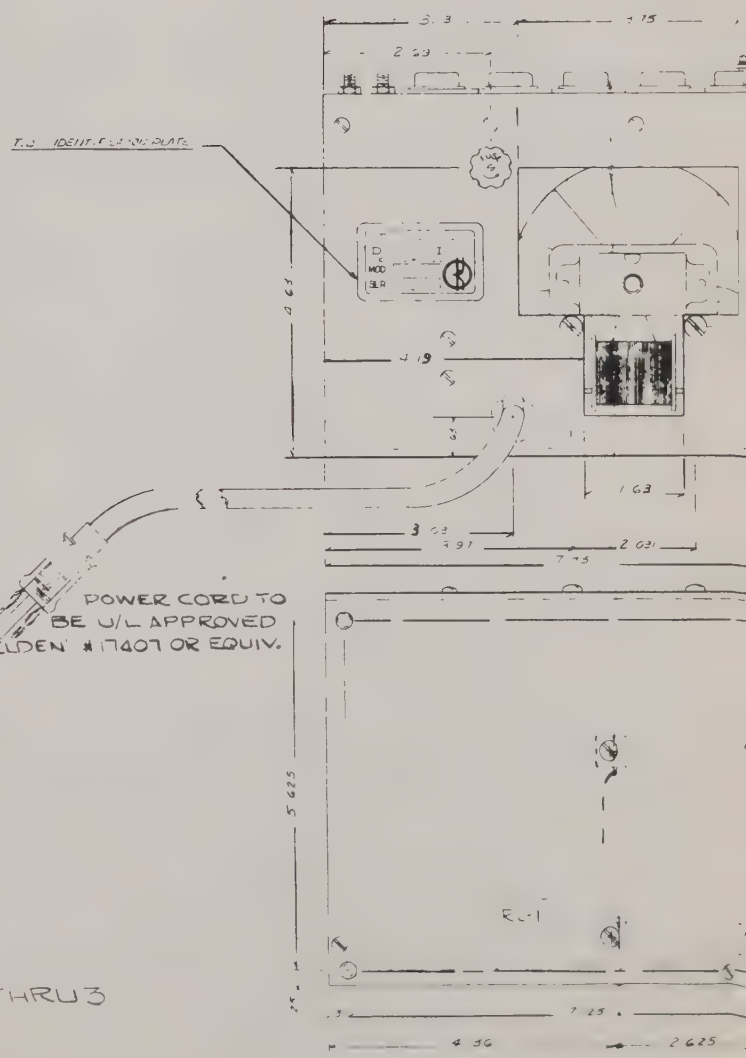
4. OUTPUT REQUIREMENTS
(38 VOLT SUPPLY)
38.0VDC ± 5 % TOTAL FOR LINE AND LOAD VARIATIONS EXCEPT WHERE NOTED
RIPPLE 500 MILLIVOLTS MAX PEAK TO PEAK
AVERAGE LOAD 2.4 AMPERE
THIS SUPPLY REQUIRES TWO OUTPUTS — ONE DIRECT (TERM 6, THE OTHER THRU A 20 OHM 50 WATT RESISTOR (TERM 7)
PEAK PULSE CURRENT OF THE DIRECT SUPPLY IS 40.0 AMPERES FOR .5 MILLISECOND PERMISSIBLE VOLTAGE DROOP 2.0 VOLTS. DUTY CYCLE 5% RECOVERY TIME 10 MILLISEC
PEAK PULSE CURRENT FROM 20 OHM OUTPUT 1.3 AMPERES FOR A DURATION OF 34 MILLISECONDS PERMISSIBLE DROOP 3 VOLTS. DUTY CYCLE 60% RECOVERY TIME 1.2 MS

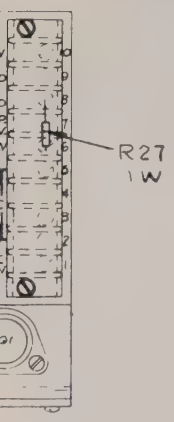
5. CONSTRUCTION
CONSTRUCTION OF UNITS TO BE SUCH AS TO MEET ALL U L REQUIREMENTS FOR N F P A TYPE II OFFICE EQUIP

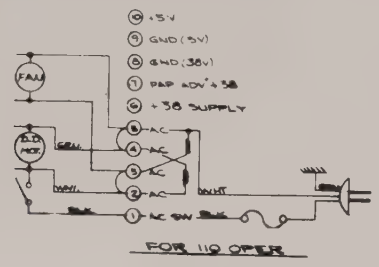
1. VENDOR - ACME ELECT CORP CUBA N Y.
PART NO — PS 59375
REF

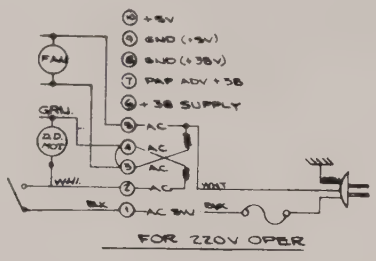
2. VENDOR - TRANSISTOR DEVICES INC CEDAR KNOLLS N. J. PART NO SPS 1.5 1
REF B03 ; 136802, THTS 1 THRU 3

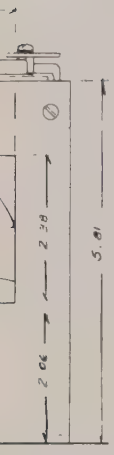
3. PROTECTIVE COVER FOR TERMINAL STRIP TO BE SUPPLIED BY VENDOR

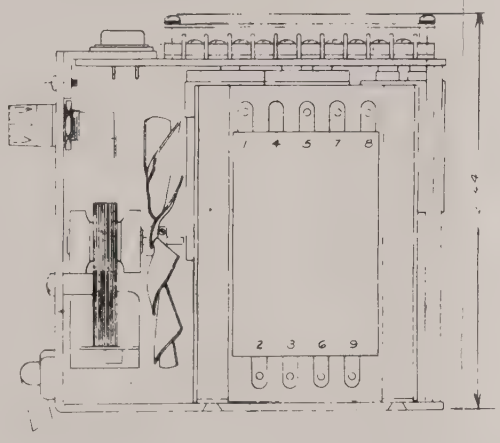






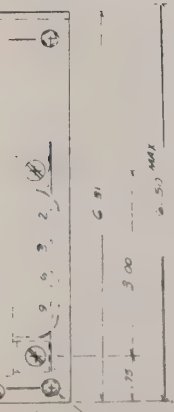






SHEET	1	2	3
REV	F	F	F

D0340770 01 02	2019
D0340549 01 02	2018
D0340687 01 02	2017
D0340360 01 02	2016
NEXT ASSY	USED ON
APPLICATION	



034036802

034036801

SHT 2 of 3

LOCATION		
MDS. MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: POWER SUPPLY		
DATE: 11/17/71	REV.: F	DRAWING NO: 034036800

Ident. No.	DESCRIPTION	PART NO.	AI PD. MFG.
C1	Cap. 1900MFD 75VDC	86F174M1	G.E.
C2	1900MFD 75VDC	86F174M1	G.E.
C3	9300MFD 50VDC	86F168M	G.E.
C4	.01 MFD 200VDC	BLACKHAWK	G.E.
C5	23000MFD 20VDC	86F132M2	G.E.
C6	.01MFD 200VDC	BLACKHAWK	G.E.
C7	1700MFD 25VDC	43F3004MA6	G.E.
C8	Cap. 1 MFD 25VDC	76F02KC1R0	G.E.
C9	Cap. .01 x 2 600V	H1-Q	CRL
C10	Cap. .01 x2 600V	H1-Q	CRL
CR1	Silicon Rect.	A15A	G.E.
CR2	〃	〃	〃
CR3	〃	〃	〃
CR4	Silicon Rect.	A15A	G.E.
CR5	Zener Diode 5.6V	1N752A	Motorola
CR6	Silicon Rect.	368 D	Westinghouse
CR7	Silicon Rect.	368 D	Westinghouse
CR8	Zener Diode 5.6V	1N752A	Motorola
CR9	Zener Diode 8.2V	1N756A	Motorola
CR10	Silicon Rect.	A15A	G.E.
CR11	Zener Diode 5.6V	1N752A	Motorola
CR12	silicon Rect.	SCE 2	Semtech
F1	Fuse	4A AGC4	BUSS
F2	Fuse	6A AGC6	BUSS
F3	Fuse	6A AGC6	BUSS
Q1	Transistor	2N3055	Westinghouse
Q2	〃	2N3055	〃
Q3		2N3055	
Q4		2N2907	
Q5		2N2907	
Q6		2N3055	〃
Q7	〃	2N3055	Westinghouse
Q8	Transistor	2N1613	Raytheon
Q9	Transistor	2N1613	Raytheon
R1	Res. 1.2K,1/2W,10%	RC20GF122K	A-B
R2	120,1/2W,10%	RC20GF121K	〃
R3	560,1/2W,10%	RC20GF561K	
R4	6.8K,1/2W,10%	RC20GF682K	
R5	2.2K,1W,10%	RC32GF222K	
R6	6.8K,1/2W,10%	RC20GF682K	
R7	Res. 820, 1/2W,10%	RC20GF821K	A-B
R8	Pot.1K,WW	BK64201	CTS
R9	Res.. 10,20W,WW	PW20	IRC
R10	10,20W,WW	PW20	IRC
R11	1K,2W,10%	RC42GF102K	A-B
R12	1K,1/2W,10%	RC20GF102K	〃
R13	560, 1/2,10%	RC20GF561K	
R14	1.2K,1/2W,10%	RC20GF122K	
R15	1.2K,1/2W,10%	RC20GF122K	
R16	1.2K,1/2W,10%	RC20GF122K	
R17	220, 1/2W,10%	RC20GF221K	
R18	1K,1/2W10%	RC20GF102K	
R19	Res. 680, 1/2W,10%	RC20GF681K	A-B

Ident. No.	DESCRIPTIO
R20	Pot 1K,WW
R21	Res.,47,1/2W
R22	1.2K, 1
R23	27,1/2W
R24	Res.,27,1/2W
R25	Res.,33,1/2W
R26	Res.,220,1/2
BL1	BLOWER
SCR1	SIL. CONT. R
TB1	TERMINAL BOA
T1	TRANSFORMER
	LINE CORD
	TERMINAL STR
	CABLE BUSHIN
XF1	FUSEHOLDER
XF2	FUSE CLIPS
XF3	FUSE CLIPS
	SPACERS
	SPACERS
L1	CHOKE 25 UH
L2	CHOKE 25 UH
RC1	SUPPRESSOR,
K1	RELAY 6 DC 25
R27	Res.,2.2K,1W,

ION	PART NO.	APPD. MFG.
	5R6L201	CTS
2W,10%	RC20GF470K	A-B
1/2W,10%	RC20GF122K	A-B
2W,10%	RC20GF270K	A-B
2W,10%	RC20GF270K	A-B
2W,10%	RC20GF330K	A-B
/2W,10%	RC20GF221K	A-B
	AYAF760-319	BARBER COLMAN
RECT.	C122F	G.E.
OARD	600-Y-10	KULKA
R	B-15456	BTC
	17407	BELDEN
TRIP	864	H.H. SMITH
ING	SR-6L	HEYCO
	341001	LITTELFUSE
	101001	LITTELFUSE
	101001	
	6-32X1/4	
	B-15681	
	B-160B	DELTA
	B-160B	DELTA
, ARC	PMR2026/	
	0.5+22	RIFA
25 Ω	W88KDX-1	MAGNECRAFT ELECTRIC CO.
,10%		

SHT 3 of 3

LOCATION		
MDS. MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: POWER SUPPLY		
DATE: 11/17/71	REV.: F	DRAWING NO: 034036800

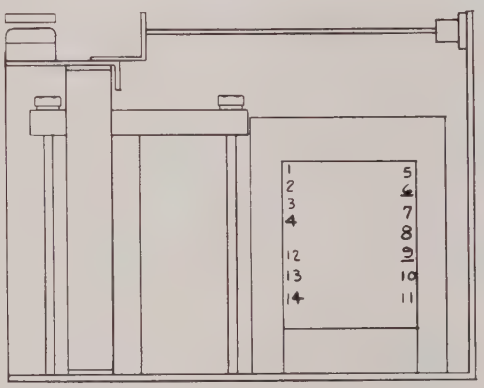
SPECIFICATIONS

1. MAX DIMENSIONS OVERALL AS SHOWN. FORCED AIR COOLING AT REAR AS SHOWN IN ZONE D6. LINE CORD & PRIMARY FUSE ALSO ON REAR SURFACE. TERMINAL STRIP & SECONDARY FUSES TO BE ON TOP & EASILY ACCESSIBLE.

2. SPLIT PRIMARY FOR 115 V ± 10V OR 230 V ± 20V, 50 ± 1 Hz OR 60 ± .5 Hz OPERATION. TOTAL PRIMARY MUST HAVE A MIN POWER CAPABILITY OF 500 VA (IN 230 V MODE) 1/2 PRIMARY MUST SUPPLY A 1.5 AMPERE LOAD AT 115 VAC.

3. 5 VOLT SPECS.
   - A - LINE & LOAD VARIATION - 5 VDC ± 5% TOTAL.
   - B - RIPPLE 50 MV PEAK TO PEAK MAX.
   - C - MINIMUM LOAD 3.0 AMPS.
   - D - OVERVOLTAGE CROWBAR SET TO TRIP BETWEEN 5.5 & 6.2 V.
   - E - FULL LOAD 5.0 AMPS

4. 38 V SPECS.
   - A - LINE & LOAD VARIATION - 38 VDC ± 5% TOTAL.
   - B - RIPPLE 500 MV PEAK TO PEAK MAX.
   - C - AVG LOAD 2.4 AMPERES
   - D - THIS SUPPLY REQUIRES TWO OUTPUTS. ONE DIRECT (TB1-6) THE OTHER THRU (2) 20 Ω 50 WATT RESISTORS (TB1-7)

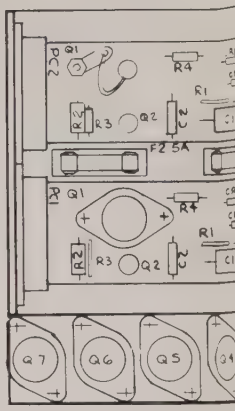


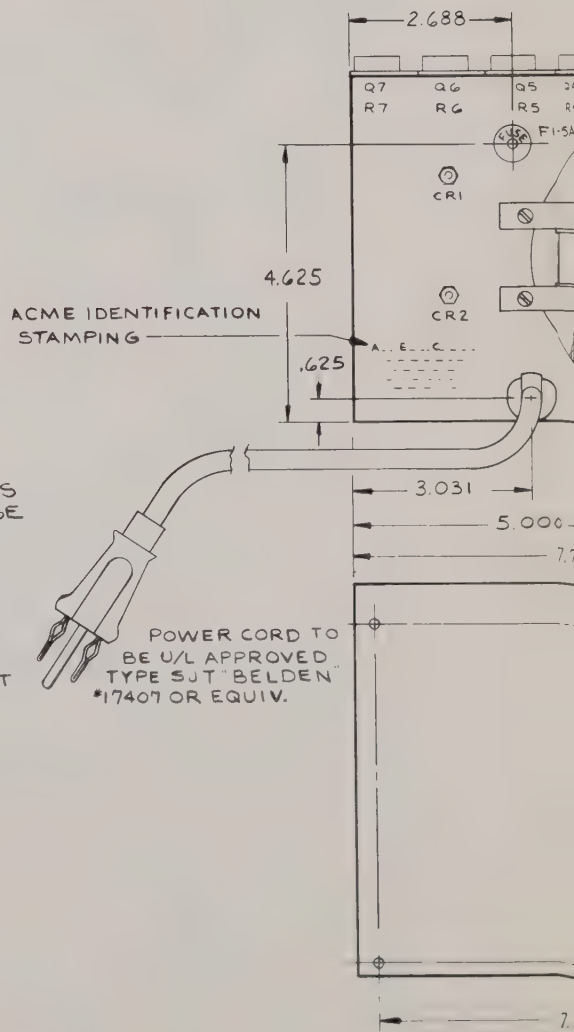
VIEW A-A

   - E - PEAK PULSE FOR DIRECT SUPPLY IS 40 AMPS FOR 1.5 MILLISECONDS. PERMISSIBLE VOLTAGE DROOP 2 VOLTS. DUTY CYCLE 5% - RECOVERY TIME 10 MILLISECONDS.
   - F - PEAK PULSE CURRENT FROM 20 OHM OUTPUT 1.3 AMPERES OF 34 MILLISECONDS DURATION. PERMISSIBLE DROOP 3 VOLTS. DUTY CYCLE 60% - RECOVERY TIME 1.2 MS

5. CONSTRUCTION OF UNITS TO BE SUCH AS TO MEET ALL U.L. REQUIREMENTS FOR N.F.P.A. TYPE II OFFICE EQUIPMENT.

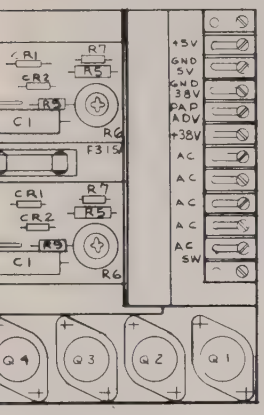
6. VENDOR - ACME ELEC. CORP., CUBA N.Y.
   PART No. PS 59401

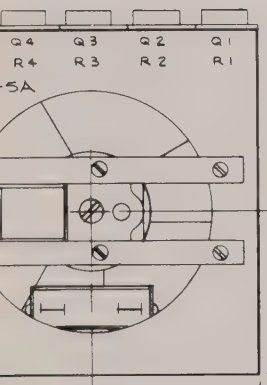


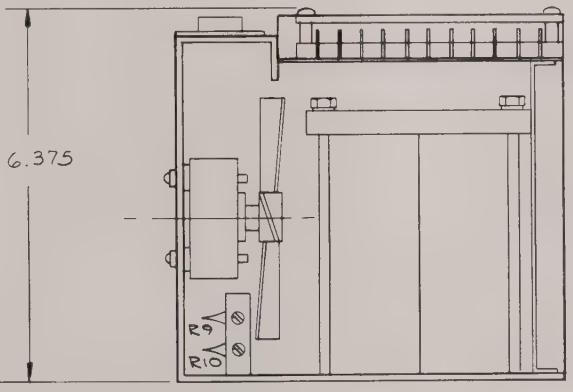


NEXT ASS'Y	FIRST USED ON
D0340360	2016

REVISIONS				
REV	ECA	DESCRIPTION	DATE	APPROVAL
A	2067	RELEASE	11/12/70	



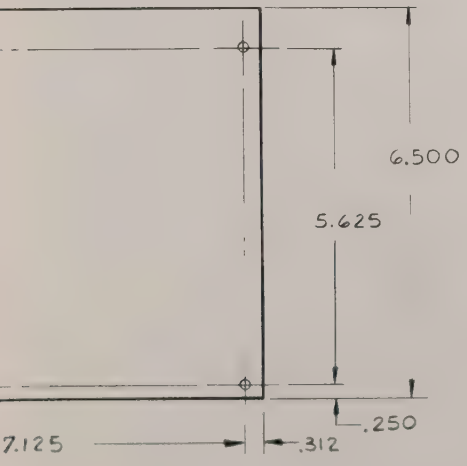




A

A

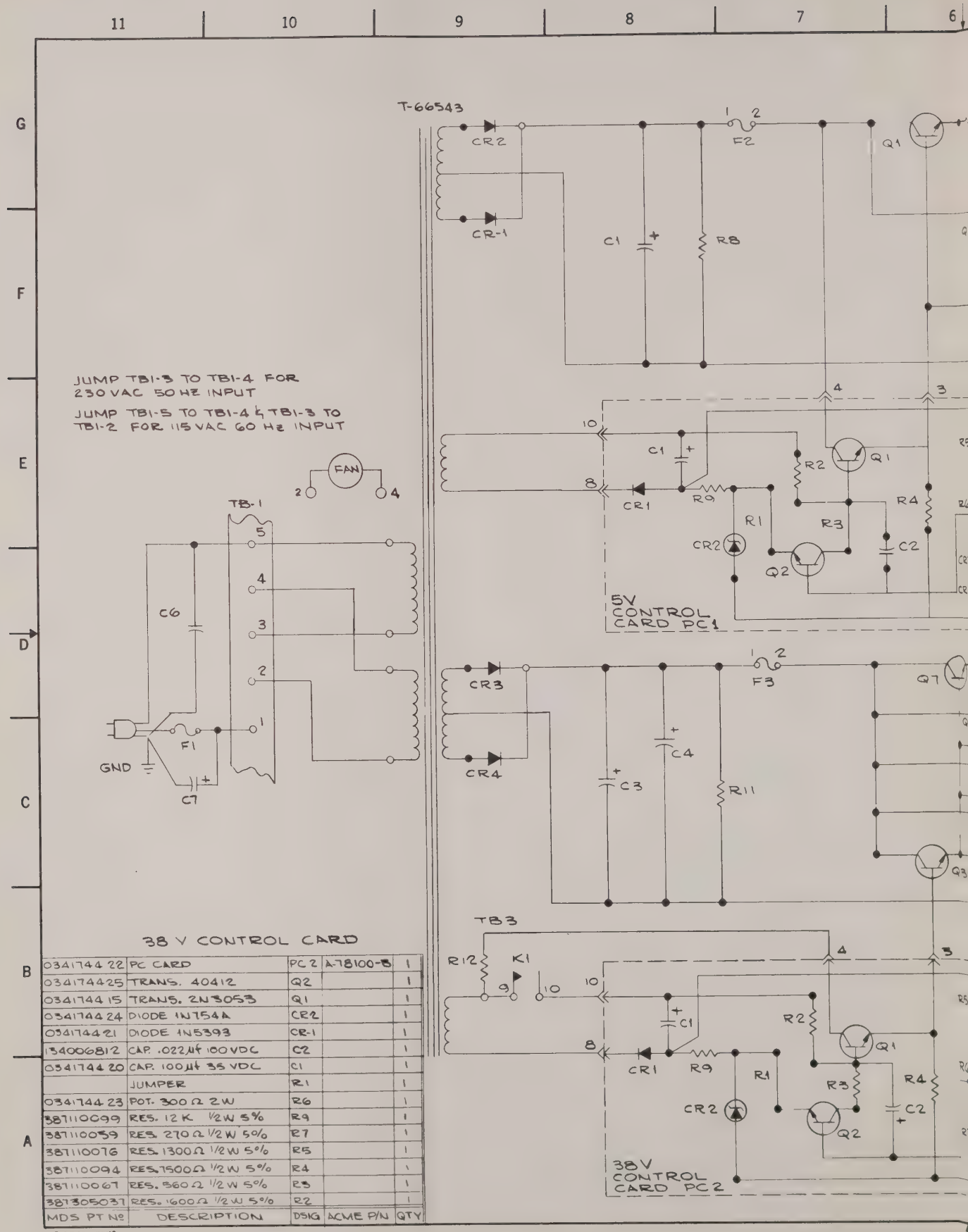
7.75



SHEET	1	2
REV	A	A

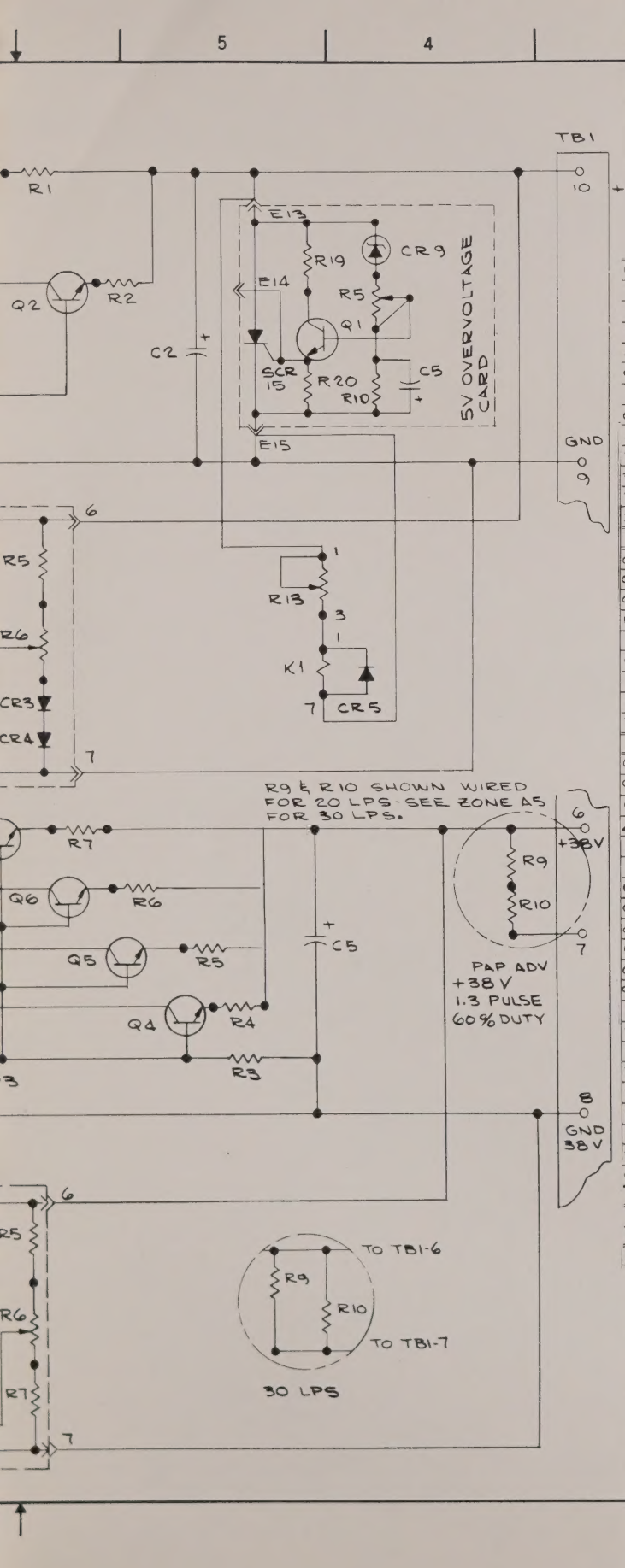
PART NO. 034174401

LOCATION		
MOHAWK DATA SCIENCES CORP. HERKIMER N.Y.		
TITLE: POWER SUPPLY		
DATE: 11/11/71	REV.: A	DRAWING NO: 034174401



38 V CONTROL CARD

MDS PT Nº	DESCRIPTION	DSIG	ACME P/N	QTY
0341744 22	PC CARD	PC 2	A-78100-B	1
034174425	TRANS. 40412	Q2		1
0341744 15	TRANS. 2N3053	Q1		1
0341744 24	DIODE 1N754A	CR2		1
0341744 21	DIODE 1N5393	CR-1		1
134006812	CAP. .022μf 100 VDC	C2		1
0341744 20	CAP. 100μf 35 VDC	C1		1
	JUMPER	R1		1
0341744 23	POT. 300 Ω 2W	R6		1
387110099	RES. 12 K ½W 5%	R9		1
387110059	RES. 270 Ω ½W 5%	R7		1
387110076	RES. 1300 Ω ½W 5%	R5		1
387110094	RES. 7500 Ω ½W 5%	R4		1
387110067	RES. 560 Ω ½W 5%	R3		1
387305037	RES. 1600 Ω ½W 5%	R2		1



REVISIONS				
REV	ECA	DESCRIPTION	DATE	APPROVAL
A	2067	RELEASE HUEY	12-15-70	L.J.

0341744 22	PC CARD	PC-1	A78100-B	1
0341744 10	DIODE 1N5392	CR 3, 4		2
0341744 21	DIODE 1N5393	CR1		1
1340091 06	CAP. .01μf 100VDC	C2		1
0341744 20	CAP. 100μf 35VDC	C1		1
0341744 19	POT. 100 Ω 2W	R6		1
	JUMPER -	R-1, 3		2
0341744 18	TRANS. 2N5135	Q2		1
436004001	TRANS. 2N3055	Q1		1
3871100 56	RES. 200Ω 1/2W 5%	R9		1
3871100 34	RES. 24 Ω 1/2W 5%	R5		1
3871100 67	RES. 560 Ω 1/2W 5%	R4		1
3871100 77	RES. 1500 Ω 1/2W 5%	R2		1
	5 VOLT CONTROL CARD (PC1)			
0341744 17	P.C. CARD		A 83749	1
0341744 16	DIODE 2N681	SCR 15		1
0341744 15	TRANS. 2N3053	Q1		1
1691020 30	DIODE 1N751A	CR9		1
1340091 03	CAP. .047μf 100VDC	C5		1
0341744 14	POT. 500Ω 2W	R5		1
3871100 97	RES. 1000Ω 1/2W	R20		1
3871100 35	RES. 27Ω 1/2W 5%	R19		1
3871100 53	RES. 150Ω 1/2W 5%	R10		1
	5 VOLT OVERVOLTAGE CARD			
0341744 13	RELAY 6V 52Ω			1
0341744 12	CAP. .02μf 1000VDC	C6, 7		2
0341744 11	POT. 200Ω	R13		1
436004001	TRANS. 2N3055	Q1, 2		2
436004002	TRANS. 2N3442	Q3 THRU 7		5
0341744 10	DIODE 1N5392	CR5		1
0341744 09	DIODE 1N5404	CR3, 4		2
0341744 08	DIODE 1N3616	CR1, 2		2
0341744 07	CAP. 6800μf 50VDC	C5		1
0341744 06	CAP. 4500μf 75VDC	C3, 4		2
0341744 05	CAP. 500μf 15VDC	C2		1
0341744 04	CAP. 13,800μf 18VDC	C1		1
2031022 06	FUSE 15 AMP	F3		1
2031300 17	FUSE 6 AMP	F2		1
2031300 16	FUSE 5 AMP	F1		1
3873060 01	RES. 51Ω 1/2W 5%	R12		1
3871120 87	RES. 3900Ω 2W 5%	R11		1
3877090 06	RES. 10Ω 25W 5%	R9, 10		2
3875030 18	RES. 100Ω 5W 5%	R8		1
3875030 46	RES. 1500Ω 5W 5%	R3		1
0341744 03	RES. .2Ω 5W 3%	R1, 2, 4, 5, 6, 7		6

COMPONENT CHART

0341744 01	POWER SUPPLY		94948	
MDS PT. NO.	DESCRIPTION	DESIGNTN	ACME P/N	QTY

:A 0341744

DATE	REV.	DRAWING NO
11/11/71	A	034174401